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WORK

An Illustrated Magazine of Practice and Theory

FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.

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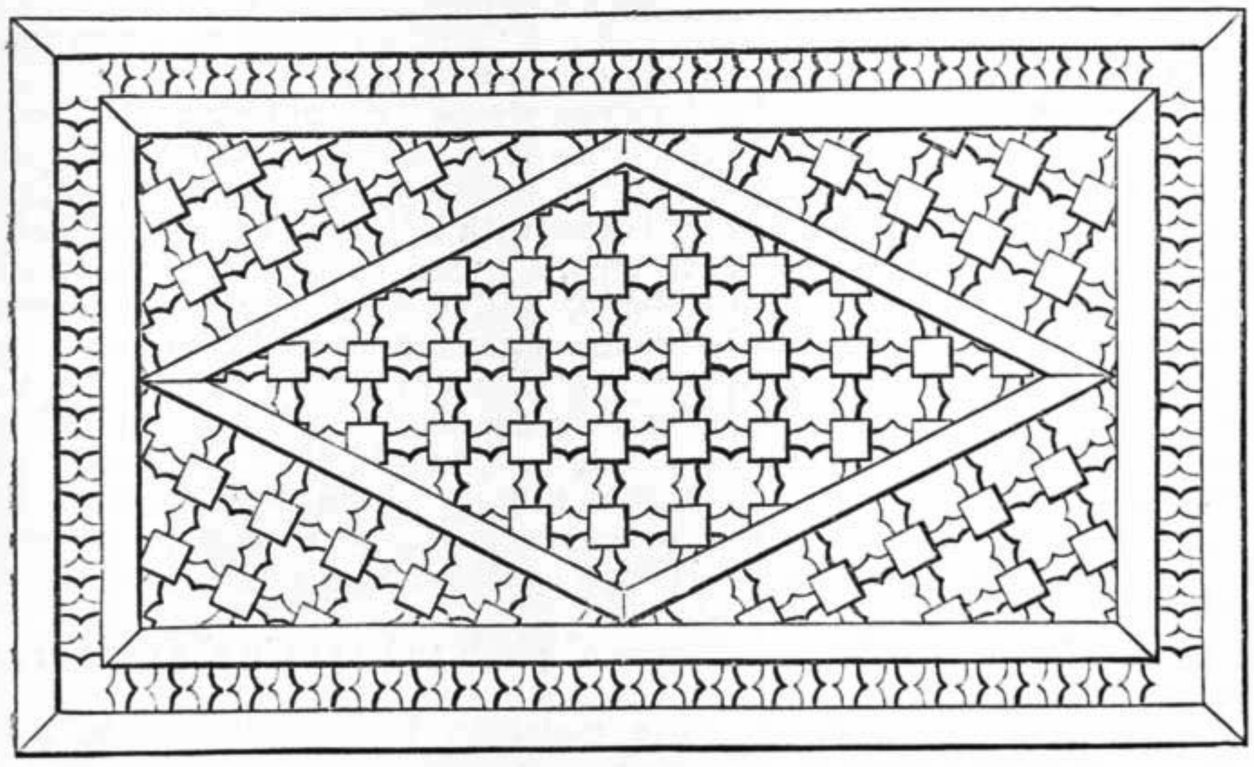
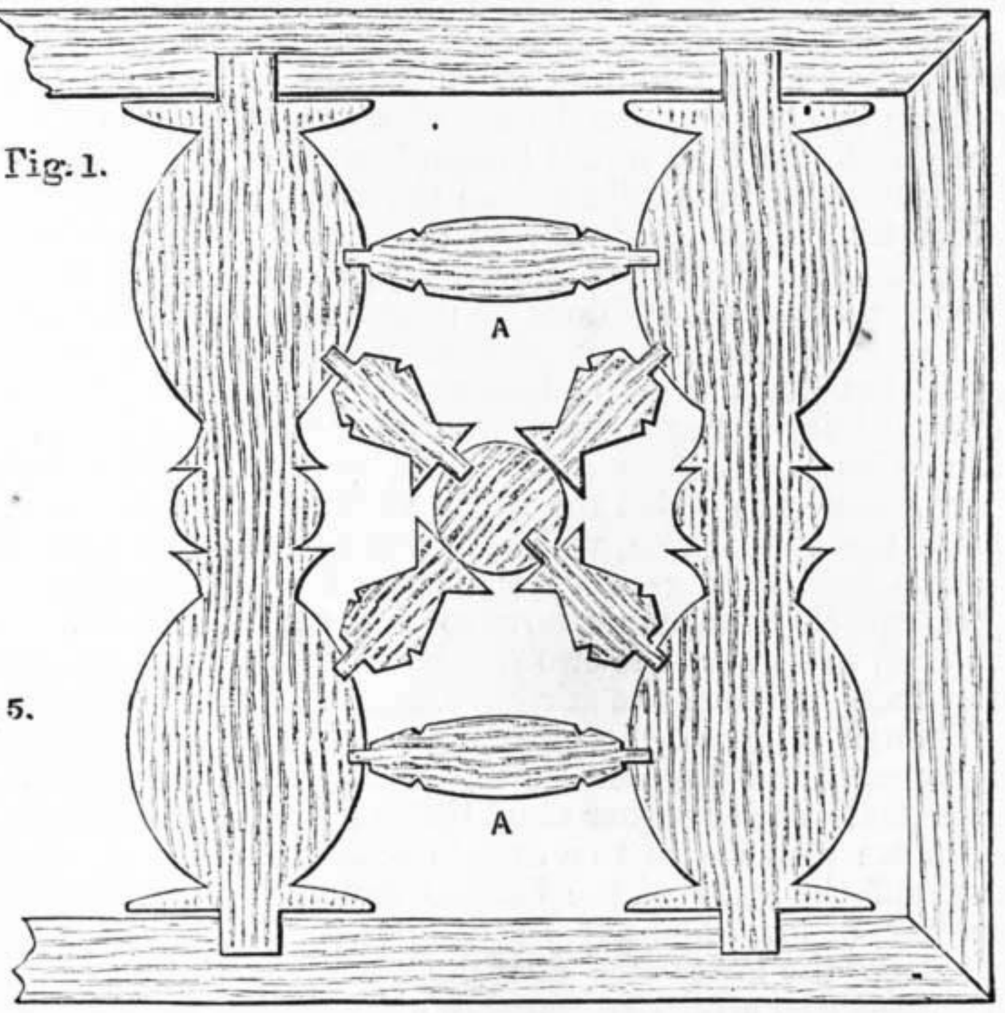


Fig. 1.



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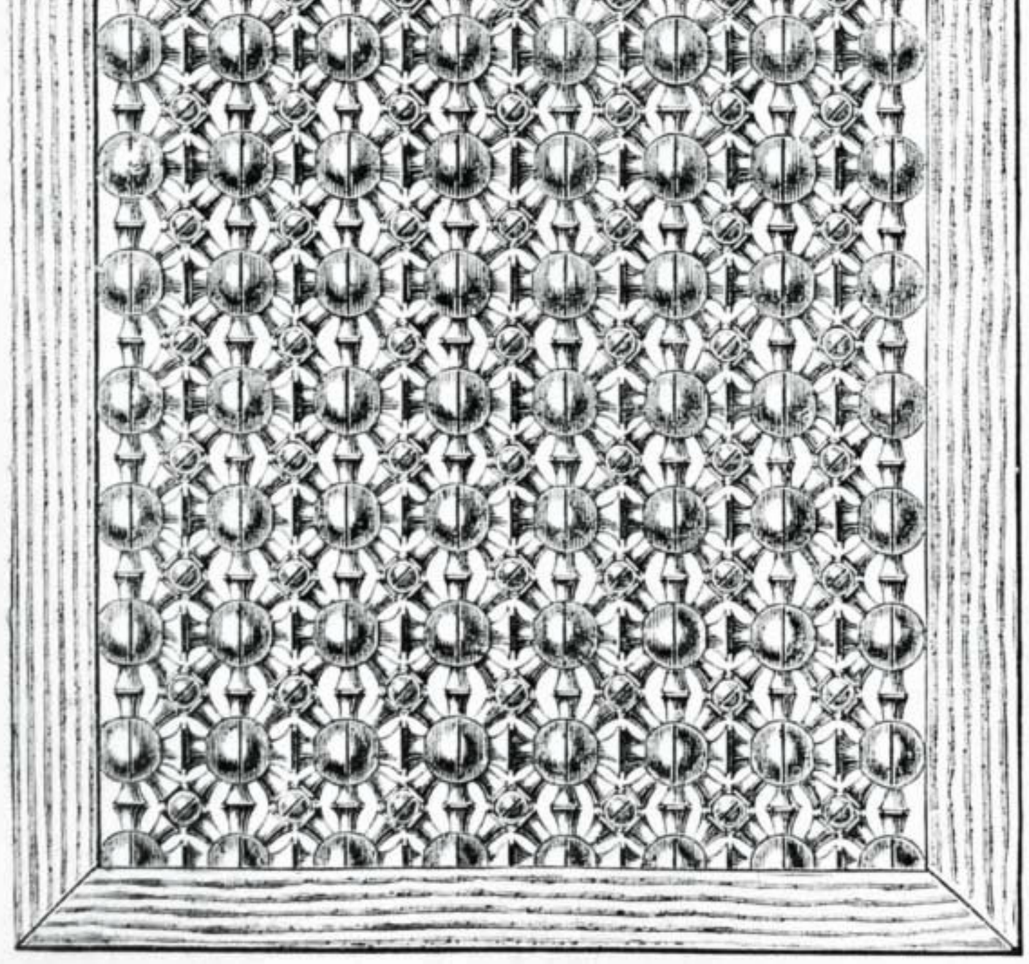

Fig. 3.

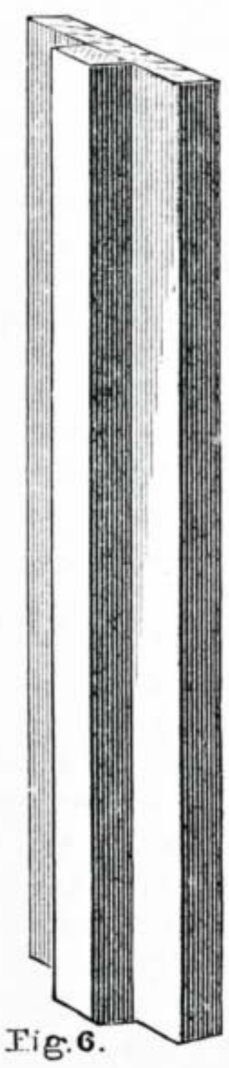

Fig. 6.

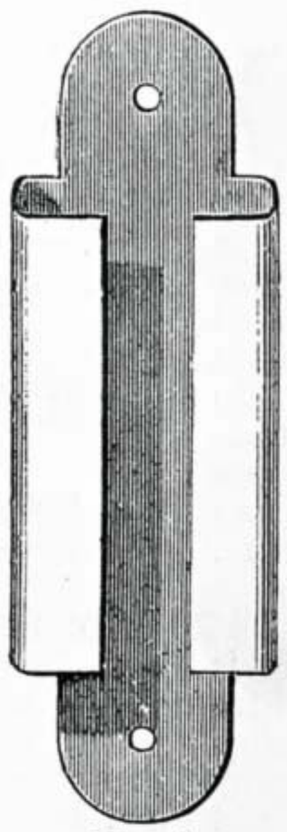

Fig. 4.

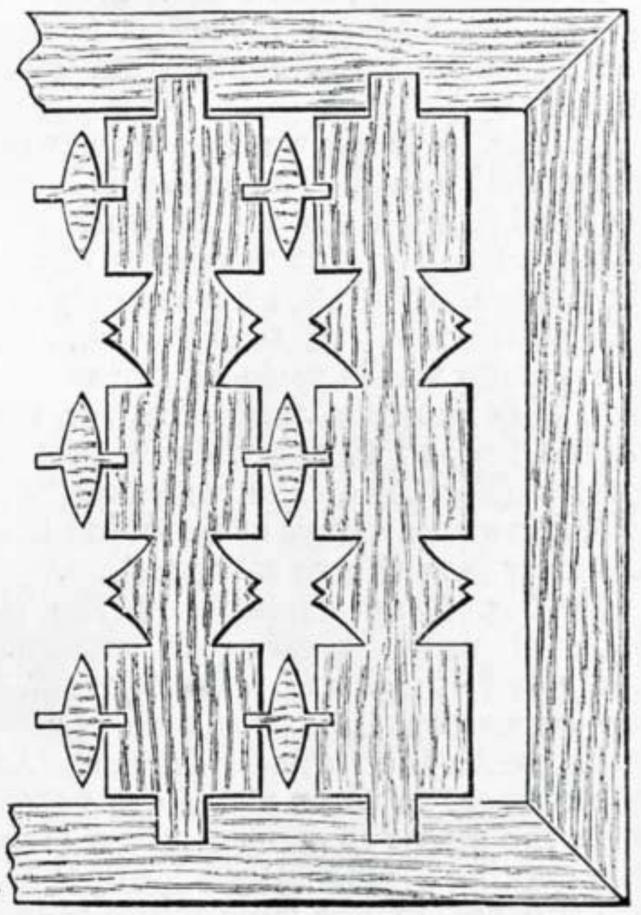

Fig. 2.

Egyptian Trellis Work. Fig. 1.—Pattern for Work Turned in Lathe. Fig. 2.—Simple Pattern of Blocks alternating with Turned Work. Fig. 3.—Panel in Turned Work complete. Fig. 4.—Brass Guide to take Frame of Panel. Fig. 5.—Example of Trellis Work made up into Panel. Fig. 6.—Projection on Side of Frame, as shown in Fig. 5, to run in Brass Guide (Fig. 4).

EGYPTIAN TRELLIS WORK.

BY C. H. OZANNE.

Though there are occasional specimens of this work to be seen in England, it is not nearly so well known as it deserves to be. Most of the readers of Work who visited the Italian Exhibition last year will have observed some pieces of furniture decorated with very poor examples. If so, they gathered a very moderate idea of its capacities. Perhaps the illustration given in Fig. 3 may enable them to form a better idea of what can be done.

It is difficult in an engraving to give a perfect rendering of what the panel is in the solid. To indicate the colour of the various woods used is difficult. The rows of beads, separated by turned intervals which run horizontally across the panel, are of walnut; the stars are arranged in squares, alternately lemon and ebony. The series of stars forming the outer square is of lemon; the series forming the square within that is of ebony; the next, lemon; and, finally, the two stars remaining are ebony.

Of course, such elaborate patterns are only used for small ornaments—such as brackets, panels, etc. For larger work the beads are coarser, and the open spaces are of sufficient size to allow the ladies of the harem to see what is going on on the other side of the screen, which protects their beauty from exposure to the vulgar gaze.

In Oriental lands this trellis work is largely used. Of course, in England we do

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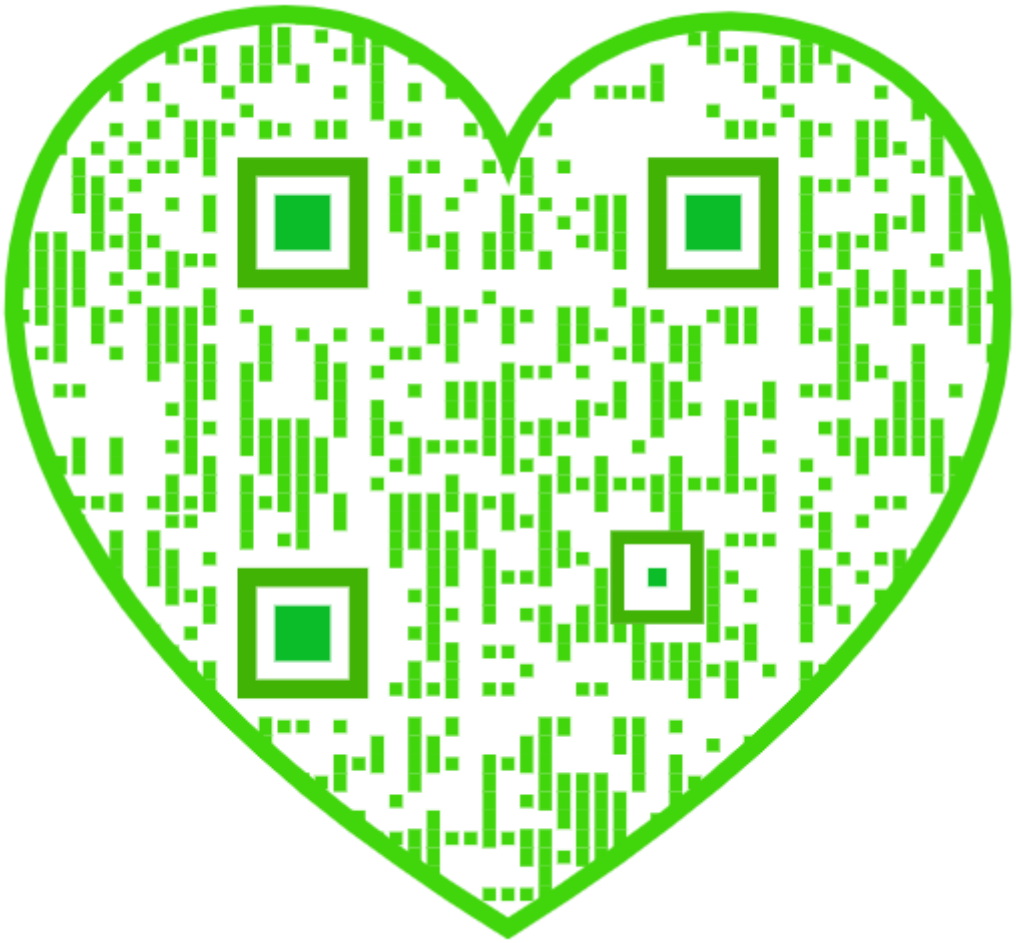

not sit in balconies, as everybody does in a hot climate; and we do not appreciate the advantage of allowing every breath of fresh air free circulation. It is not so rare a commodity with us. To fully value the trellis work, it is necessary to be the wife of a jealous pasha. You are as carefully guarded from every male eye as a rare tropical plant from frost. In the harem, or women's quarters, you are allowed to remove your veil, but then every care is taken to prevent your beauty from rousing the admiration of any passing Lothario. Your gorgeous cage is hot and close, and female society is apt to pall—I do not speak from a masculine point of view. Man was not born to live alone, nor was woman.

No doubt the harem ladies appreciate the trellis that allows nothing of their faces to be seen but the occasional flash of a bright eye. But that they would prefer less careful protection is manifest from the way in which they allow their veils to fall forward—by accident—as they are driven in closed carriages along the fashionable promenades, and expose the greater part of a round, somewhat vacant face, leaving the rest shrouded in a transparent film of gauze. That this accident is designed is evident from the way in which the white veil tones down the complexion, which is pasty, and throws into strong relief the large black eyes, which they know how to make the most of, in spite of the two repulsive blacks who take charge of the fair bevy.

Though it is not the custom in this enlightened land to seclude the fairer sex from male society other than that of their lords, we still desire to a certain extent to shut off the gaze of the curious from the privacy of our homes. In passing along the street the lower half of many a window is screened by a blind of muslin, wire, laths, and, occasionally, fret work. None of these is artistic, and all more or less prevent the inmate of the room from seeing the passers-by.

In Fig. 5 is shown the framework of a simple half-blind. The centre is intended to be filled in with the trellis work, shown in Fig. 3, turned to suit the design of the frame fixed upon. In Fig. 5, I have merely indicated the position of the trellis work, and leave the pattern to the taste of the worker. In Fig. 6 is shown a projection for the ends of the frame; this is to run in the brass guides (Fig. 4). The practical workman will know many ways of fastening the blind. I merely give this as a suggestion.

In Fig. 2, an example of the simplest style of work is given in section. It is composed of strips of wood squared. These are turned up, leaving square blocks alternating with the turned intervals. As many as necessary of these strips are turned, and then the pieces to connect these strips with one another. Generally a lot of these latter are run out in one length, and then cut up as required. Holes are bored in the square blocks of the strips, and the little pegs inserted in them. The whole is tied up with string, and slipped into the holes in the frame.

Fig. 1 is not quite so simple. The strips are entirely rounded in the lathe—the pattern can be varied to any extent. The star is composed of three separate pieces, as shown. To put it together when the panel is a large one requires practice, and, if fine work, a very delicate touch. A strip is placed in the hollow of the hand; the long piece of the star is inserted in its hole in the bead; the second ray of the star is put into the next bead of the same strip; then the last piece of the star is inserted in its centre. One of the little pillars, A, is put into position, then a second strip is added, and held by the fingers. The two other ends of the strips are then slightly opened to allow the second piece, A, to be inserted. The two strips are then pressed together, and will not fall apart if gently handled. The holes for the pegs should be slightly large; this makes it easier to be put together. When framed up it is very strong; more so than fret work, and the effect is richer. The solid bars should always run the shortest way of the panel.

To build up a large panel will require some practice and patience, as it frequently falls to pieces as the last bit is being put into position. The result will fully repay the little trouble necessary to attain the requisite dexterity.

In the illustrations enough is given to put any one who takes trouble into the way of producing a variety of patterns. The shape of the beads, and of the pieces forming the star, can be varied to a great extent. In a long strip one of the stars can be replaced by a little pillar, and the corresponding bead lengthened to suit.

In future papers I hope to be able to give some examples of the application of this style of ornament to ordinary pieces of furniture. Many of these are far from artistic.

I am sure that any workman who fitted up a half-blind in the style of Fig. 5, selecting his trellis work from Fig. 3, and mounted it in his window, would have his hands full for many a day.

I have several specimens of this work in my drawing-room, and every visitor with any eye for artistic furniture is at once struck with it. It is, in my opinion, one of the most effective styles of decorative wood work that I have seen; and I am sure that if any reader of Work saw the general effect he would agree with me. It has an advantage over relief carving in that it shows up well against the light, and that various coloured woods can be used in combination. It is not nearly so difficult to learn as carving.

REPOUSSÉ METAL WORK.

BY GAWTHORP.

For Illustrations of Articles in Repoussé Metal Work, see Art Supplement issued with this Number.

Before touching on the various designs embodied in the Art Supplement presented with this number, let us see what repoussé work really is. Every one knows that "repousser" means "to push again," and hence "to push back" or "away." The simplest definition of the work is pushing the metal from one side and pushing again on the other side, until it assumes a "bold relief" and "correction of redundant form;" in short, raising and modelling the metal. Here we would point out that that class of work done by many amateurs on wood or lead, and which consists simply of hammering with a nail or punch upon the groundwork of the design, until by the expansion of the metal the pattern rises up in formless lumps, is *not* repoussé work at all. We therefore strongly urge those who fondly hope to imitate the great masters, or even to produce something artistic, to give up this method at once, for though by it "bold relief" may be obtained, yet there is no beauty of form nor correct modelling.

It will therefore be seen that flat chasing, for which designs (Nos. 2, 4, and 6) are intended, is but a step in the right direction, and should almost only be employed upon those articles which, of necessity, must be kept quite flat, such as tea trays, teapot stands, etc.

But to return, it is quite evident that the metal must be solidly backed up by some plastic material which will give at just the right spot, and at the same time possess an adhesive power that shall make the metal and itself one solid but impressionable mass; one, in fact, that would keep a true impress of the work were the metal suddenly and adroitly removed. What material will answer these requirements? Some writers mention wax; and no doubt wax was used by the earlier workmen.

Many amateurs (and, unfortunately, some school teachers) choose wood or lead, but none of these fulfil all requirements. Pitch, toned down with tallow and plaster of Paris, is very largely used by professionals, and is, no doubt, well adapted for the purpose; but as many amateurs and ladies have complained of the annoyance caused by the splintering off of fine chips which adhere to hands, face, and clothes, the writer has invented a composition which avoids the unpleasantness, and has been pronounced excellent by those who strongly object to a "mess."

Pans of pitch to be put in the oven or on the fire should *never* be used.

The metal to be decorated should be brass, copper, silver, or gold, and should in all cases be properly prepared; by which, we do not mean highly polished, but carefully planished and freed (by facing) from the scarcely visible flaws that will afterwards mar the work. The metal should also be selected for its softness, for some rolled metal, especially brass, is exceedingly hard and liable to crack. The metal must now be attached to the cement. This is effected by heating the metal, warming the cement, and pressing the former upon the latter by weight or otherwise, until absolute contact is obtained all over the metal.

The choice of tools is a very difficult matter, in which many amateurs have been grossly imposed upon; and our advice is, unless the buyer is an experienced workman, never buy of mere salesmen. The tools should be light, well tempered, and carefully faced.

The hammer should consist of a light steel-faced head, as shown in Fig. 1, upon a slender but strong handle. Mallets are not suitable for striking the tools. The tracer (Fig. 2), which is gently and rapidly tapped as it is steadily drawn along the outline of the work, as shown in Fig. 3, must be a well-made tool, properly pointed, without being too sharp, or the worker will be under a great disadvantage. Next in importance are the raising tools (Fig. 4). These are used after the metal has been turned face downwards upon the cement, and are hammered into the back of the design to produce on the face the required height and form. Having once more turned the metal face upwards, any "redundant form" is corrected with the modelling tools, which are very similar to the raising tools. Before removing the metal from this position, texture, surface, and matting tools (various forms of which are represented in Fig. 5) may be used to "superadd diversity of texture and even colour," and also to mat in the background. Other useful tools are: a mallet for roughly raising large and unimportant surfaces; a drawing point, with which to mark out the

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design on the metal; a pair of strong shears; a spirit or other lamp, and blowpipe to fix the metal on the cement; an iron for smoothing the surface of the pitch; a sand-bag to set the work upon; and a few unimportant sundries.

The metal used should always be large enough to allow of a margin, and in the case of trays and salvers, it is advisable to purchase them ready made, especially as it is impossible to make up some forms, such as those with plain spun edges, after working, without injuring the pattern thereon.

"But to what use can I put this work?" asks the amateur. The following list of articles to which repoussé work may be adapted will perhaps satisfy such an inquirer. Tea trays, salvers, card trays, ornamental shields, plaques, candle-sconces and rings, alms dishes, spectacle cases, match boxes, flat candlesticks, menu holders, teapot stands, glove and handkerchief boxes, crumb trays and scoops, photo frames,

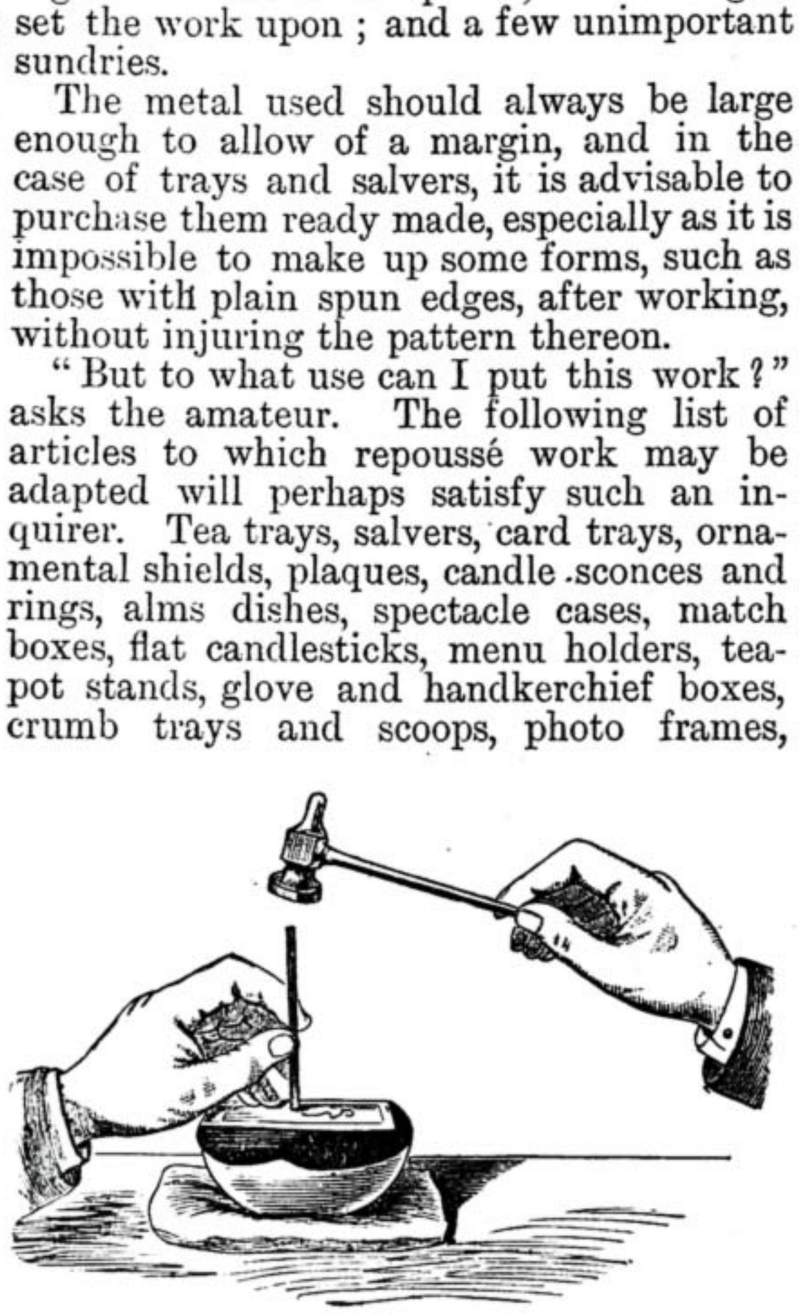
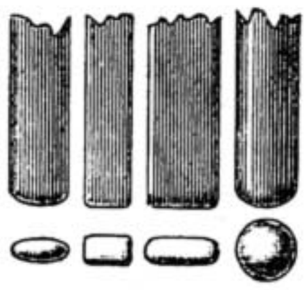


Fig. 3.

Fig. 1.



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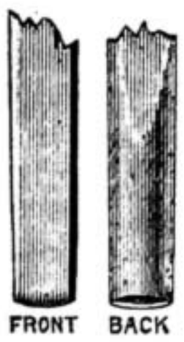

Fig. 2.

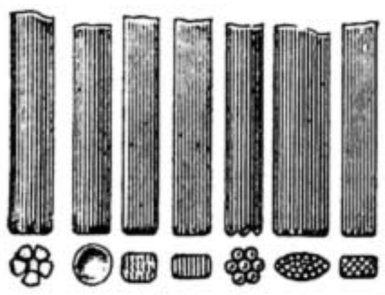

Fig 5.

Fig. 1.—Hammer for Repoussé Work. Fig. 2.—Tracer: A, Front; B, Back. Fig. 3.—Mode of Using Tracer. Fig. 4.—Raising Tools. Fig. 5.—Surface and Matting Tools.

finger plates, ash trays, brush and mirror backs, letter racks, panels for firegrates, coal boxes, cabinets, bellows, book mounts, and innumerable articles for which there is a great demand at bazaars and fancy fairs.

We will now make a few notes on the designs accompanying the present number, hoping at some future time to give more minute details of the actual working and use of the tools. The designs for flat chasing (Nos. 2, 4, and 6), should be traced, after they are drawn on the metal, with a medium tracer, not too blunt, carefully copying every line, endeavouring to produce the effect of an engraving. This done, the groundwork in Nos. 4 and 6 should be punched. That of No. 6 with a small ring tool or perloir. No. 5 may have a background put in with any fine tool. In No. 2 the ornament is to be matted or tooled over, leaving a bright background. As No. 6 is intended for a teapot stand, it should be worked on thick metal, and, when finished, have four small brass balls screwed to the back.

In Nos. 1, 3, 5, 7, 8, and 9, the outline should be traced with an ordinary tracer, moderately thick and not too sharp, tracing lightly where little relief is required, and more strongly in those parts that should be more highly raised. It must here be noted that in designs for true repoussé, no shading lines or marks to represent shading must be put in, as all effect of light and shade must be obtained by proper modelling; indeed, very little more than the mere outline should be traced. For raising, five or six modelling tools and a blunt tracer are required. Start with the bolder parts, taking them down in one surface, leaving details to be put in after general effect is obtained. Where sharp relief edges are required, use the blunt tracer just inside the outline. Having modelled the design as well as possible, turn the metal over again, thus bringing the work face uppermost; then trace round the outline with a blunt tracer. Touch up the modelling, smooth away roughness and excrescences, and then put in the background with suitable mats.

Some work is greatly enhanced by tooling over the raised design, but this requires much practice to produce a good effect, but, nevertheless, is well worth the painstaking effort necessary to learn this really difficult part of the art.

BORING SMALL CYLINDERS.

BY OLLA PODRIDA.

II.—Simple Way of Boring Cylinders in Self-acting Lathe with Saddle—Packing Up—Mounting and Setting Cylinder—Roughing Tool—Facing Flanges—Boring Bar—Wedge—Conclusion.

In the previous article on this subject, three different methods of manipulating work of the above nature were described. First, by chucking and boring in a self-acting traversing lathe with slide rest. Next, by means of hand tools, D bits, etc., in a common lathe provided with T rests only; and lastly, a makeshift, whereby the boring could be accomplished by hand without having recourse to a lathe for that purpose. All of these methods, and the last two in particular, are suitable only for small work, or where the bore is short, the difficulty of obtaining a smooth true bore with—in the case of deep works—a necessarily long and unavoidably springy tool being obvious.

The present article takes us a step further in describing a method whereby large as well as small cylinders may be treated, provided that a suitable self-acting lathe with a good saddle is at hand. The advantage of the method about to be described is that a practically parallel bore is obtained with a minimum amount of trouble. I use the term *practically*, because the wear of the tools in cutting prevents a perfectly true result being obtained in any case where a large surface has to be operated upon. This is of course unavoidable; all that can be done is to make sure that the tools used for the finishing cut are of good temper, and stand well, and this selection can only be made from experience, or rather actual experiment. When such a tool is found, carefully note it, and place it aside for such special duty only.

The process about to be described will be more clearly understood by reference to the illustrations. Fig. 4 is a front elevation of the lathe, showing the cylinder in black, mounted and fixed on the saddle ready for operation. For the sake of clearness, the cylinder is shown in section, and to economise space, part of the lathe heads and bed is omitted. The cylinder is held down to the saddle by bolts, *b*, *b* (see also Fig. 5, end elevation and cross section through boring bar and cylinder), and straps or plates, *p*, *p*. These straps bear on pieces of hard wood, *w*, *w*, fitted to cylinder body. Liners, or packing pieces, for keeping the cylinder at its proper height are interposed at *l*, *l*; these are also of hard wood. B is the boring bar, *c* its carrier, and *d* the driver. The T-shaped slots at *g*, *g*, are for the holding-down bolts, *b*, *b*. Figs. 6 and 7 give details of one method whereby the tool, *t*, is adjusted and secured in the bar, B.

Before proceeding with the details of setting and boring, it may be observed that in cases where the cylinder may appear too large for the lathe, the heads can be packed up to meet the case. This is commonly done in practice, and more especially in small shops where the choice of machines is limited, and their range small. Some engineers keep cast-iron packing pieces for this purpose, but hard wood will answer quite as well, at a pinch. The only thing to be watched is that, when the lathe feed is taken from the leading screw, the heads are not packed up beyond the reach of the change wheels; where the feed is obtained from an independent back shaft, it is only necessary to lengthen the small driving belt as required. The illustration given herewith may be taken as representing the boring of a 3½-in. cylinder in a 4½-in. lathe, with a boring bar 2¼ in. in diameter.

The procedure in mounting and setting the cylinder is as follows:—The slide rest having been removed, and the face of the saddle cleared, the cylinder is packed up to agree roughly with the lathe centres, and lightly bolted down by means of the straps, *p*, *p*, and bolts, *b*, *b*. The bar is then shipped in place between the centres, and the bore of cylinder set carefully to it by means of a tool stuck in temporarily for the purpose, or by the callipers or V-foot scribing block. If found too low, small alterations can be effected by strips of paper under the liners, *l*, *l*; if too high these liners must be planed down, always, and in either case, making allowance for compression of the liners. Lateral adjustment can be readily given by blows, where required, with a wooden mallet or block.

It is a good plan to check the bore with outside of cylinder, so as to ensure the thickness being equal all round. An important point to be observed is the adjustment of the saddle upon the lathe bed. If this is neglected, and it happens to be slack, an oval bore will occur, owing to side play. If too tight, undue strain will be thrown upon the self-acting gear, and a breakdown may result.

It will most likely be found that the strain on the holding-down bolts, *b*, *b*, has sprung the saddle slightly, and caused it to bind on the V's of lathe bed. This must be watched, and the wedge piece in front of bed adjusted accordingly. Everything having been set and adjusted, a fair start on the boring may be made. Two cuts, a roughing and a finishing one, will be sufficient, and the feed should not be heavy, say at the rate of forty cuts per inch. The roughing cut should be arranged so as to leave about $\frac{1}{32}$nd of an inch for the finishing one. Unless a circle has been struck on the flange for guidance, the

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tool will have to be set to depth by trial, a sharp look-out being kept with a pair of inside callipers set to size.

The roughing tool may be of the shape given in Figs. 6 and 7, but the finishing one must be flatter on the cutting edge, not so

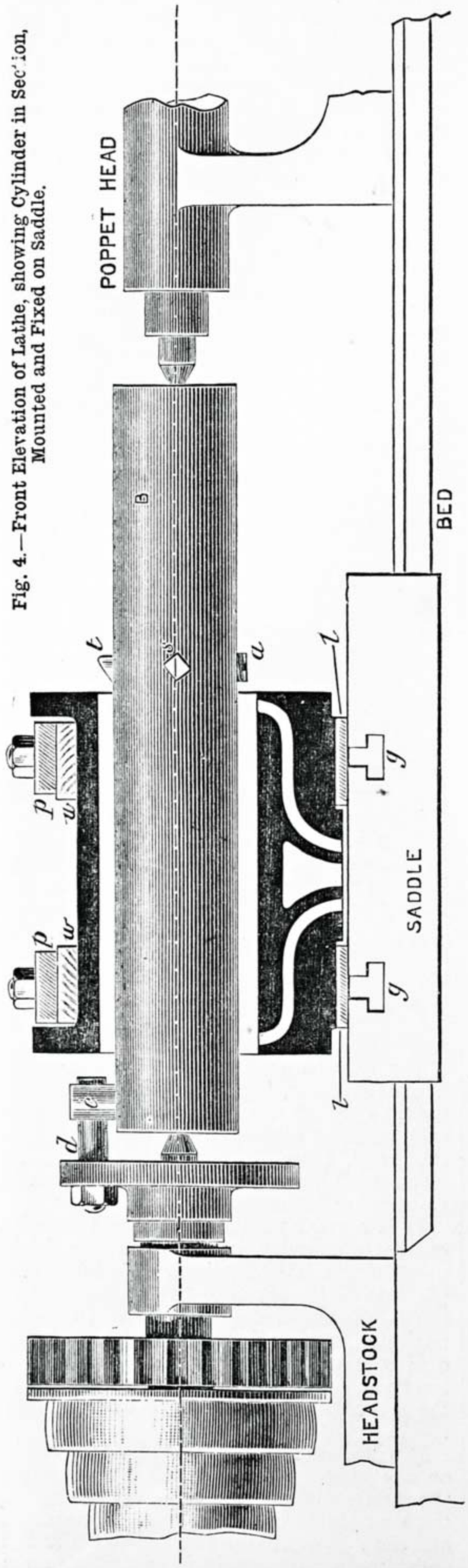

Fig. 4.—Front Elevation of Lathe, showing Cylinder in Section, Mounted and Fixed on Saddle.

pointed, but thicker and bluffer, so as to guard, as far as possible, against "chattering." A slight alteration in the shape of the cutting edge of a tool often makes a wonderful difference in its performance, and, in this direction, experiment is by far the best guide.

By substituting knife or side cutting tools for the boring ones, the flanges may be faced in position, but the operation must be carefully carried out to avoid shifting the job; the whole surface of the flange should not be attacked at once; a narrow ring should first be faced commencing from the bore, then another larger one brought to the first, and so on, shifting or lengthening the tool by degrees until the whole surface has been roughed down. During these operations the feed must be given by hand, and the rough facing should be done after the rough and before the finished boring cuts. If possible, the flange of steam chest, or rather slide face, on which the cylinder is shown resting, should be secured by wedges or stops to prevent its twisting or shifting laterally upon the saddle. Before running the finishing cut through bore, the holding-down bolts must be slightly slacked off equally, so as to avoid, as far as possible, flattening or springing the cylinder; but in the case illustrated, owing to the proximity of the bolts to the flanges and the small size of cylinder, this would not amount to any appreciable extent. It is, however, important in the case of large cylinders. I may add that where a suitable mandrel is at hand, the flanges may be faced upon it by a distinct operation, and with considerably less trouble than by the boring bar.

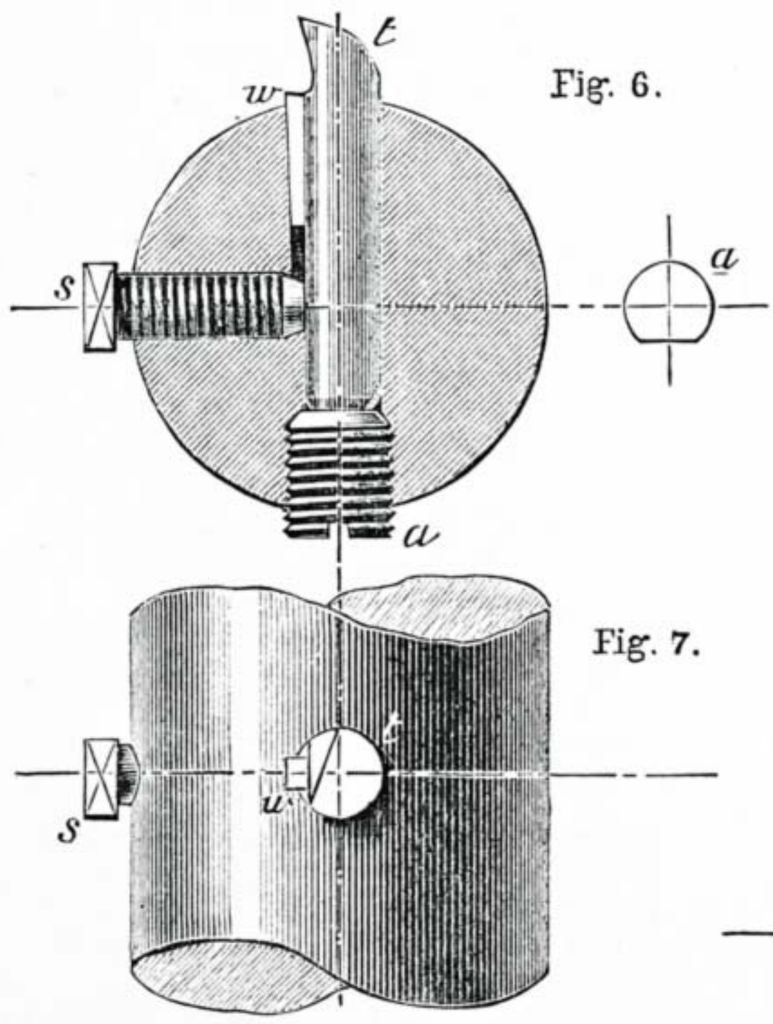

Fig. 6.

Fig. 7.

Fig. 6.—Section of Boring Bar, showing Method of Fixing Tool. Fig. 7.—Bar in Elevation.

Before concluding, a word or two about the boring bar must be added. It should always be as stiff as possible, and, therefore, as large in diameter as reasonable clearance for chips will allow. For large work, a block or head is keyed on the bar, and the cutters carried therein instead of in the bar as illustrated. The centres in ends of bar should always be carefully drilled to fit those of the lathe, and it is imperative that the one which runs on the dead centre of poppet should have a small hole drilled up a short way so as to clear the centre point, as well as to hold a small supply of lubricant; and with regard to this matter the centre must on no account be allowed to run dry or squeaky. This is important, as the finishing cut must be kept going *without the least stoppage* from start to finish. Fig. 6 gives a section of the bar, showing the method of fixing and adjusting the tool. Referring to Figs. 6 and 7, *t* is the tool adjusted vertically by the screw, *a*, and secured by the setscrew, *s*, the latter being further assisted by the wedge, *w*, which fits into a suitable slot and tightens against a flat upon the front of tool, which is shown clearly in the section at *a*, to the right hand of Fig 6. The setscrew, *s*, should be of steel, and slightly hardened at the point. The hole through bar for tool is drilled, in the first place, and then tapped at the bottom to receive the adjusting screw, *a*. The hole for setscrew is then drilled and the slot for wedge cut, after which the setscrew hole must be tapped. Both of these screws must fit well into the holes so as to guard against their working loose. The wedge, *w*, must also be of steel, but it should not be hardened. The tool should fit well into its bed, not too tight, but just a nice driving fit. It can be easily backed out when necessary by removing the adjusting screw, *a*, and using a drift. If at any time on account of limited clearance there is no room for head of setscrew, *s*, it may be taken out and the tool held only by the wedge, *w*, but this wedge must on no account be omitted, as on it depends the rigidity of the tool.

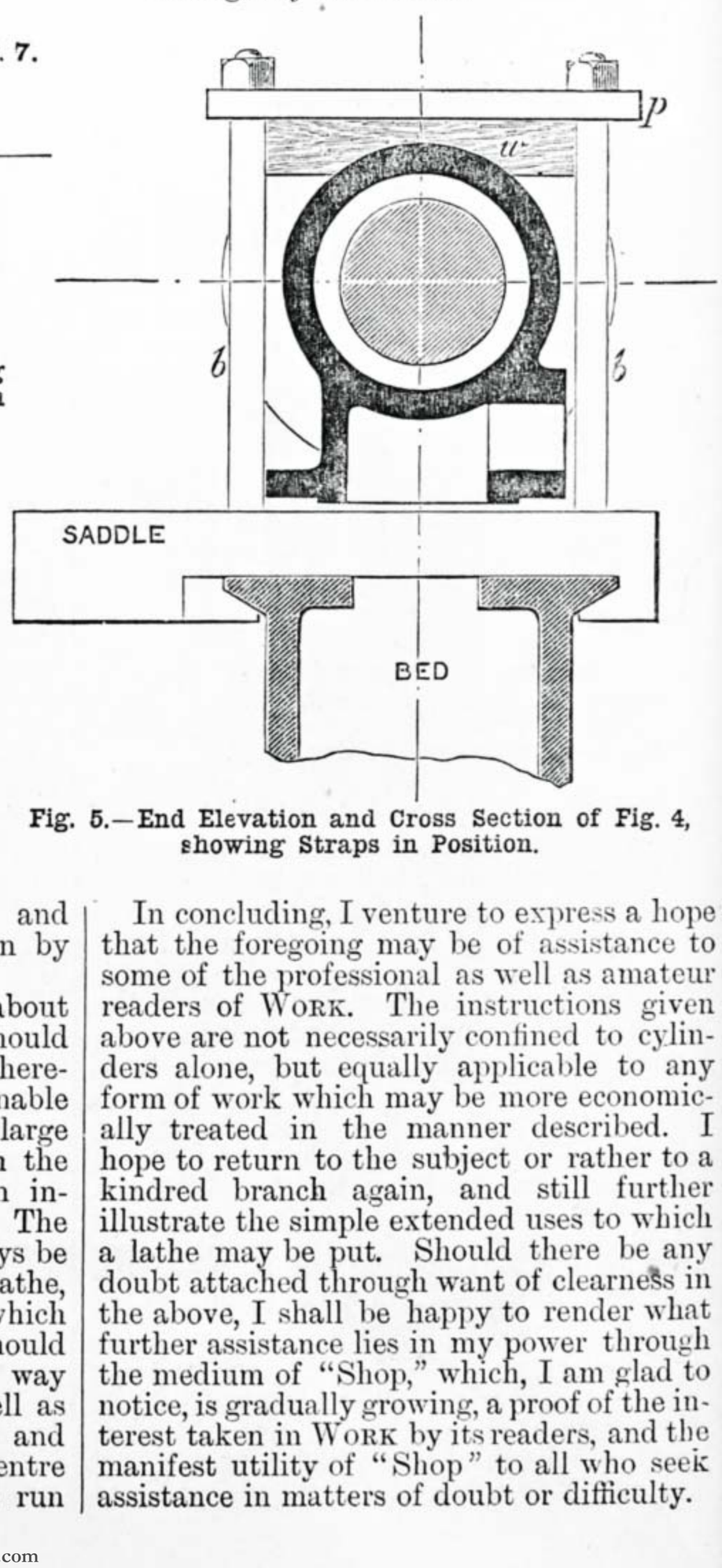

Fig. 5.—End Elevation and Cross Section of Fig. 4, showing Straps in Position.

In concluding, I venture to express a hope that the foregoing may be of assistance to some of the professional as well as amateur readers of WORK. The instructions given above are not necessarily confined to cylinders alone, but equally applicable to any form of work which may be more economically treated in the manner described. I hope to return to the subject or rather to a kindred branch again, and still further illustrate the simple extended uses to which a lathe may be put. Should there be any doubt attached through want of clearness in the above, I shall be happy to render what further assistance lies in my power through the medium of "Shop," which, I am glad to notice, is gradually growing, a proof of the interest taken in WORK by its readers, and the manifest utility of "Shop" to all who seek assistance in matters of doubt or difficulty.

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THE SCRATCH OR BEADING ROUTER.

How to Make and Use it.

BY DAVID DENNING.

UTILITY OF SCRATCH—ITS OBJECT—ITS ACTION—FORMATION OF BEADING—SHAPES OF CUTTERS—MOULDINGS ON EDGE OF WOOD—POINTS TO BE LOOKED FOR IN SCRATCH—STOCK—FENCE OR BUTT—SCREWING STOCK TOGETHER—WORKING WITH SCRATCH—CUTTERS—COMBINATION OF BEADS BY SIMPLE CUTTERS—MOULDING CURVES—STOPPING AND FINISHING BEADS—FORMATION OF CUTTERS—CLEANING UP WORK.

IT is well known to those who are constantly in trade workshops that, whatever the handicraft pursued in them, there are little appliances for facilitating operations which are seldom seen by the outside public; that is, the tools are home made, and such as are not articles of sale in the ordinary tool shop. One of them is the "scratch," a tool much used by cabinet makers in forming the beads which play such an important part in modern furniture of the so-called Early English type. It is, however, not strictly correct to say that the scratch is not obtainable at tool shops, for, in a more elegant shape, it is offered for sale under the name of "bead router," or some similar title which has a better sound than plain, commonplace "scratch." However called, it is nevertheless only a modified form of the tool about to be described; and without wishing in any way to disparage the router, I do not think it can claim any advantages in practical work over the scratch. In point of economy, the latter has the best of it, for it can be made for as many pence as the other costs shillings, without any very great demands on time or skill. Another thing to be preferred about the home-made article is this: extra cutters can be prepared with the minimum of trouble as they are wanted to cut or scratch any particular form of beads or small mouldings. Still, as I have said, I do not want to decry the ready-made router of the shops; and the rougher variety, which, by the way, is the only one I have seen in use among practical workmen, may be offered as an alternative form for those who for any reason are debarred from purchasing ready-made tools.

Perhaps, however, there may be some who do not quite understand what the object of the scratch is; and as it is more than probable that some of our readers are not acquainted with it, some little explanation of the work that can be done with it may be given before describing the tool more minutely. To begin with, it may be described as a kind of cross between a plain scraper and a moulding plane. Its action is a scraping one, but the cutter is held firm in a stock, which is so contrived that the edge of the cutter, when fixed for any given piece of work, shall always act on the same place on wood being beaded. A rebate plane does the same, but the blade of a plane works by cutting, and not by scraping. By filing the scraping end of the scratch cutter to any desired outline, it will be seen that the wood brought under its influence assumes a corresponding outline. Thus, for instance, if we want to cut on the surface of a piece of wood—say, on the square rails between two drawers, on the drawer fronts, on the framing of a door—three beads as in Fig. 1, all we have to do is to shape the end of the cutter accordingly, as shown in Fig. 2, where it will be seen that the beads are replaced by hollows.

On the same principle, any desired section of beading can be formed by preparing a cutter of negative or reverse outline. An immense variety of the shapes that may be assumed by beadings is, therefore, at the disposal of any one who will take a little trouble to work them out. We are, perhaps, rather too apt to forget that the plain beading (Fig. 1) is not the only form this simple and effective means of decoration is capable of assuming, but that others are just as easy, although more complicated-looking. When the cutter is made, and of course the handle or stock to hold it in, there is no more difficulty in forming one outline than another.

A further use that may be made of the scratch, and one that will probably commend it to those wood workers who are, as yet, unacquainted with its powers, is the facility with which small mouldings or beads on the edges of wood may be made with it. Take the common one shown in Fig. 3, so useful for the edges of shelves, etc., or the more elaborate-looking beaded edge in Fig. 4. No expensive tool, nor yet much skill, is needed to work these. The scratch will do them both; or if a stop-clamper is wanted, it may still be pressed into the service. Surely, enough now has been said to show the utility of the tool, and also to give some idea of its scope; so, without more ado, let us see how it may be made. Please note that the form and general construction are only to be regarded as typical; for one peculiarity of those tools which are generally made by the user of them is that they are seldom found alike in minor details. The things, not being made by machinery, or to a given pattern, are generally modified in some way or other to suit the fancy or convenience of the workman; and if a number of them were examined, it would most likely be found that, though there might be a general resemblance, no two would be exactly the same.

In the scratch, broadly speaking, the following points would be found in all, as without them it could not be a useful working tool:—They are, firstly, a cutter of sufficient strength to cut or scratch; and, next, a stock which, while holding the cutter firmly, shall yet allow its position to be altered when desired, and of such length and shape that it can be conveniently held, and the efforts of the workman applied with the best advantage. Further, as already hinted, there must be some guide by which the bead can be worked in a uniform line. These being the requisites, all other details are merely matters of

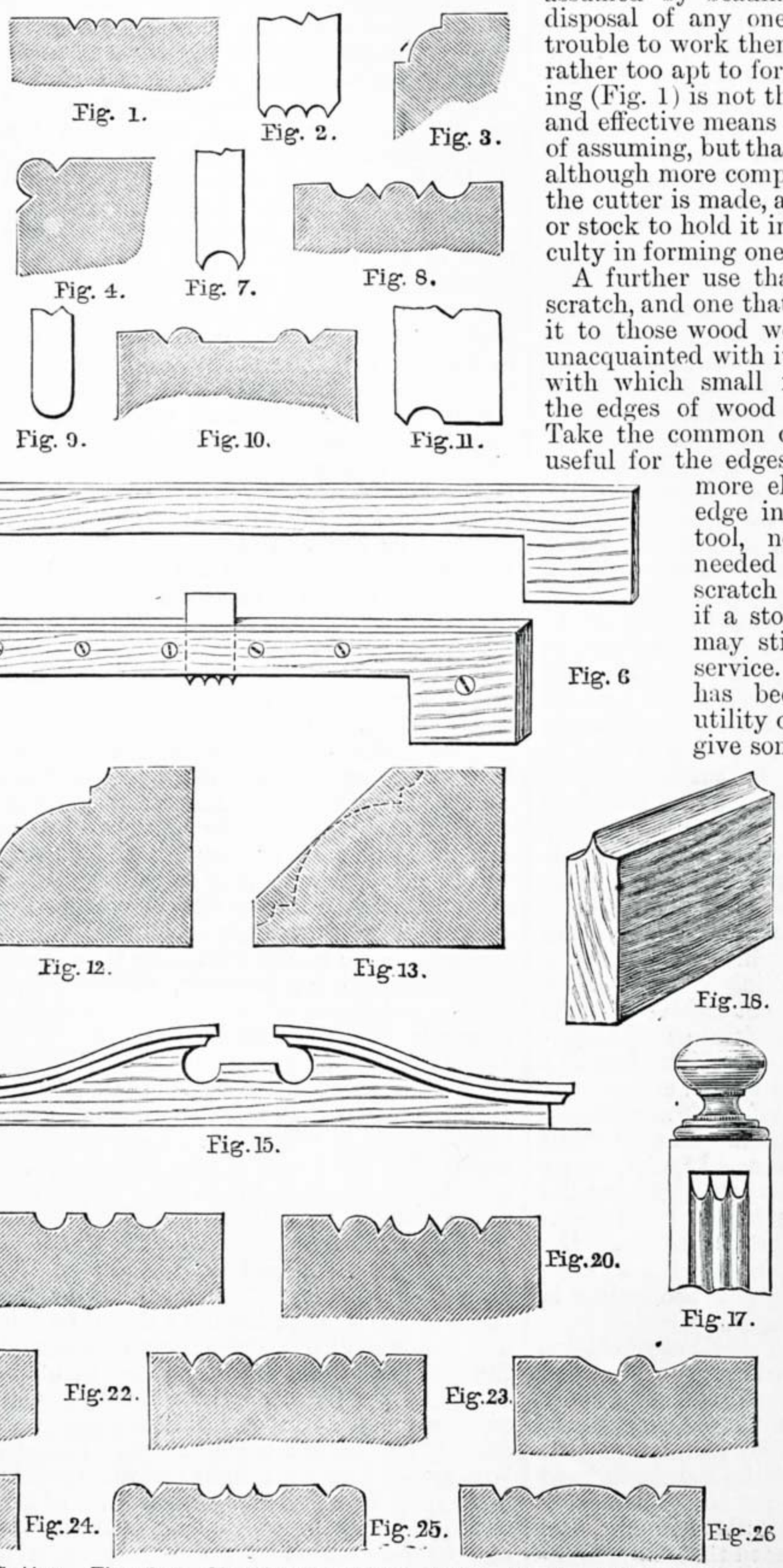

Fig. 1.—Beads. Fig. 2.—Cutter. Figs. 3, 4.—Moulding on Edges. Fig. 5.—Shape of Stock of Router. Fig. 6.—Scratch or Bead Router Complete. Fig. 7.—Cutter for Bead. Fig. 8.—Bead between Hollows. Fig. 9.—End of Cutter for Hollows. Fig. 10.—Beading with Sunk Flat between. Fig. 11.—Cutter for Fig. 10. Fig. 12.—Moulding. Fig. 13.—Wood prepared for Moulding. Fig. 14.—Position of Cutters for Moulding. Fig. 15.—Curved Moulding on Pediment. Fig. 16.—End of Upright with Knob. Fig. 17.—Alternative Finishing for Beads. Fig. 18.—Piece of Wood for Rubbing between Beads. Figs. 19-26.—Sections for Scratchings.

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personal convenience, and for the present, at any rate, may be left out of consideration.

The stock is composed of two pieces of wood shaped as shown in Fig 5. The size is not important, but for ordinary work 8 in. to 12 in. in length will be found convenient, as it is sufficiently long to allow of being firmly held, and not so long as to be cumbersome. For the thickness, ½ in. will do very well. The width of the narrow part may be about 1 in., and of the wider part, forming the shoulder or fence, 1½in. to 2 in. The wood should be hard and strong; but, beyond this, it does not much matter what it is. Beech, ash, oak, and others of similar character, are all suitable, though, if equally convenient, the preference should perhaps be given to that first named.

It may be well at this point to say something about the width of the fence or butt end of the stock. When beading the edge of a board, this is not of much consequence, as the only difference with a deep fence will be increased friction; but if the surface is the part to be beaded, it will readily be seen that the fence should not be thicker than the board, if this is laid on a bench. With a wide board, such as a panel, the edge may overhang the bench, so that in this case the size of the fence does not much matter. As, however, rails and styles have frequently to be beaded, it will be found convenient to keep the fence narrower than the thickness of the wood it is to be worked against. Theoretically, a shallow fence is best, though, in practice, not much attention is paid to the theory. However, all that is necessary is that the fence shall be a little deeper than the projection of the cutter, in order that when this is applied to a new surface, it may be guided properly. Of course, it is necessary that the shoulder must be at a right angle with the lower edge of the stock, *i.e.*, those parts which will come in contact with the wood being beaded, will be at this angle. It does not matter whether the two parts of the stock are made separately, or are cut from one thick piece and afterwards sawn apart; but, in either case, it will be well to round off the lower surface a little, much as the stocks of cutting and marking gauges often are. In fact, if we take one of these tools as exemplifying the scratch, we shall not be far out; the essential difference being, that in a gauge the block or fence is movable with a fixed cutter, while in the scratch the cutter is movable.

The two parts of the stock are held together by screws—ordinary screw-nails, which should be stout. Three, or at most four, nails will be required for each stock, though it is quite possible to manage with only two. Still, it will be better to have one through the shoulder end. The position of the other screws is not of importance, provided they are so placed that they clamp the wood sufficiently to hold the cutter. As this may have to be moved to any part of the stock, it will be convenient to have several holes bored for screws, so that they may be used in whatever position may be most convenient for the work in hand. Fig. 6 shows the completed scratch, with the cutter fixed; and the mode of working it is as follows, though it may be almost superfluous to give this, as the manipulation must be almost self-evident:—The wood to be beaded is placed against the bench stop, or otherwise held, as if it were to be planed. The cutter (by the way, this, the stock, and the two combined are all, in workshop parlance, generally called the scratch, though, for the sake of description, I have particularised them) is placed at the same distance from the fence that the intended bead is to be from the edge of the board. Screws are tightened up—with an ordinary screw-driver—so that the cutter will not slip.

In working with the scratch, the right hand grasps the butt end, and the left the other end of the stock, which is held at a right angle to the edge of the wood to be worked on, with the shaped end of the cutter downwards. The fence is pressed against the edge of the board, and the scratch worked backwards and forwards till the beading is formed. Now, very little experience will show that the cutter should not project much below the lower edge of the stock, and that much of the appearance of the beads will depend on the way the cutter is set. Remembering that the cutter acts till the stock comes in contact with the surface, there will be no difficulty in understanding that it ought not to project much—only sufficiently, in fact, for all the members of the beading to be exposed. If it project too much, the beads, instead of being on the same surface as the level of the wood, as they generally are, will be sunk. If they are intended to be the latter, no difficulty will be experienced in making them so, by slightly projecting the cutter a little more.

Now about the formation of the cutter, to which some attention must be given, that cleanly-made beads or moulds may be the result. Steel is the best metal to use, and it goes without saying that it should be hard, such as that of which scrapers are made. The thickness is immaterial, so long as the metal is sufficiently rigid, but in excess, the difficulty of shaping the cutters will be increased. It may be said that the thickness of an ordinary scraper will do for any ordinary purpose, and, if desired, a scraper may be used for forming the cutters from. To do so, however, entails some labour, and pieces of broken band saws are generally employed for cutters—partly, no doubt, because they are little more than waste, but especially because the width is already prepared. Of course band saws vary in this respect; and to say that the width of a band saw is the proper dimension for a cutter, is much like telling one that anything is about the size of a piece of wood; so it may be said that the width of a cutter must depend on the size of the bead to be formed. This must not be too large, as the scratch, though a useful tool, is not a powerful one, depending entirely on the strength of the operator; and in unaccustomed hands, at any rate, the labour of cutting a wide series of beads, say anything over ¾ in., is not a slight one. Perhaps ½ in. would be a good limit for the novice; but so much depends on the hardness of the wood to be scratched, that no definite rule can be laid down. As this may seem a small limit, it may be suggested that any width of beading can be got by simply altering the position of the cutter, so that it scratches parallel with any that have been already made. Thus with a single narrow cutter with one recess, as in Fig. 7, a series of beads, which need not be limited to three, as in Fig. 1, may be scratched. It may, however, be said that three is a very usual number for these beads. Working on the same principle, it will be seen that almost any combination of beadings may be made by using different single cutters; thus the beading shown in section (Fig. 8), consisting of a bead between two hollows, may be made by using two cutters shaped as in Figs. 9 and 7, the former being for the hollows and the latter for the bead. Again, a beading such as Fig. 10 may be formed by simply reversing a cutter shaped like Fig. 11.

Hence it will be seen that a combination of beads to almost any extent may be made by a few simple cutters. What applies to beads on flat surfaces, it will also be seen, applies to mouldings, though these will be found more troublesome to work if the members are of large dimensions. Generally speaking, for obvious reasons it will be found that the work of shaping a moulding is much reduced by, as far as possible, preparing the wood—that is, cutting as much of the superfluous stuff away as convenient with a plane or other tool (say, a spokeshave for curved mouldings), and merely leaving the outlines of the moulding to be scratched with the bead. Thus, supposing that a length of moulding of the section given in Fig. 12 is intended to be worked from a piece of rectangular section, it will be obvious that the work of the scratch may be greatly lessened by planing the wood to the section shown in Fig. 13, leaving comparatively little waste to be removed by scratching. Though the large member of the moulding may seem a big one for the scratch to work, it must not be forgotten that the cutter may be reversed, for, the member being ¼ circle, it will be seen that a small cutter of ⅛ circle will do for it. Care will be required in cutting such mouldings, to see that the cutters are set at proper lengths, so that there may be no serious inequalities. Slight ones are of small consequence, as they can be removed with glass-paper. For such a moulding as that shown, the cutters, therefore, will only be two in number, their respective positions when in the scratch tool being as in Fig. 14, where, for the sake of explicitness, a short space is shown between each.

Perhaps, however, the chief use of the scratch—at least, where moulding planes are not available—is not so much in forming straight mouldings as in moulding curves—as, for example, that for a curved pediment like Fig. 15. When only a bead is to be scratched, or a small moulding planted on, it can be done much more easily with the scratch than by carving. In preparing curved beads or mouldings, the only special caution that need be given is that the stock should always be at right angles with the bead, in order that this may be parallel all through with the edge of the wood.

Now, when scratching a bead, or beads, these may either be extended to the end of the wood, as in a panel or the frame of a door; or they may be stopped, as they often are when they are on the front of pilasters, especially when shelves are supported by these, or when a little piece of carving is added. To discuss when a stopped bead or one extended to the end is best is out of the question here; but to "point a moral," take Fig. 16, representing the end of an upright surmounted by a turned knob. There is no special reason for taking this, beyond the circumstance that it is very often seen in modern furniture. With such a termination, there can hardly be two opinions about the desirability of the bead stopping a little below the end instead of running right up to the knob. On working the scratch, it will be found that a clean stop cannot be made, so the only thing is to scratch as far as convenient, and trim off the roughness at the end with carving tools, or, in default of them, with the next best substitute, a fine firmer chisel, taking care that

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the cut across the end is decided and sharp without encroaching on the flat. The beads should be neatly rounded right up to this cut. Another method of finishing the beads is simply to shave them off to meet the transverse line, as shown in Fig. 17. This entails less work of the two, but has, perhaps, hardly so sightly an appearance as the other. In beading the edges of shaped work, it will also be necessary generally to finish them off by carving; but as outlines vary so much, it is impossible to say that this will always be the case. A trial will always show whether it is necessary to cut or not; and the hint is given, more that recourse may be had to cutting tools when required than to say that they must be used.

Possibly something should be said about forming the cutters and preparing them, though most people will be able to devise means of doing so without being told how. Briefly, it may be said that they are merely filed down, small fine files of the ordinary kind being used. Too much care cannot be taken in shaping the cutters, for, whatever the outline of these, the worked beading will have the same. The action of the scratch being a scraping one, not a cutting one, the edges should be square and sharp without any "burr." As a rule, careful filing will do all that is necessary; but those who know how a scraper is sharpened need not be told that a scratch cutter may be finished in the same way. In order to ensure perfect accuracy in filing the scratch, it is not a bad plan to form a kind of mould of two pieces of thin wood, ½ in. or even less, with ends shaped as the cutter is to be. By placing this between them (using screws to clamp them together, or fastening them up in a bench vice) the cutter may be shaped with very little trouble. The wood serves as guide, not merely for shape, but by it the edges of the steel can be filed up truly square, even by those who are not skilled in the work.

When beads have been worked by the scratch, it will generally be found that they need "cleaning up" by papering. Only fine glass-paper should be used, and care be taken that the papering does not destroy the character of the beads by blunting corners or destroying rounds. To use the paper properly, it should be held over the edges of thin pieces of wood rounded off to fit the various members as nearly as possible; thus, between two plain beads a piece of wood trimmed off at the end, like Fig. 18, would be useful as a support for the paper; in the use of which, however, I must repeat, caution and discretion are required. A good bead should be clean, with a well-defined outline; and the advantage that may be taken of such a simple mode of decoration is by no means trivial.

The combinations that may be made are almost endless; so that, with a little consideration, many surfaces that it would otherwise be necessary to leave plain may be relieved from utter flatness without materially increasing the amount of labour bestowed on them. By way of showing what may be done in this direction, a few beads—or, rather, combinations—are given in Figs. 19 to 26, and from these suggestions no doubt the intelligent worker will be able to form others. He will also be able to determine the application of this kind of ornamentation to many surfaces which would otherwise be left plain and untouched, and the kind of ornaments which would be best suited to the article of furniture under treatment; there being no difficulty in preparing a cutter to carry out the style of adornment required.

"TIPS" FOR TYROS.

BY OPIFEX.

7.—Buhl Work.

Many amateurs, perhaps, do not know that what is known as "Buhl Work" is simply fret work executed in a peculiar way, and applied to the decoration of furniture, etc.

Very handsome frames and other small articles may also be produced by any one who possesses a fret-sawing machine, as this class of work cannot well be done with an ordinary fret saw.

Procure a sheet of thin sheet brass of the required size, which must be perfectly flat and free from dents; also a sheet of ebony veneer (true buhl work requires tortoise shell) of the same size and thickness as the brass; glue these securely upon the sides of a piece of cardboard, and then paste a sheet of white paper upon each side; place between two flat smooth boards, and apply good pressure. When dry, draw your design, and cut in the ordinary way with a fine saw; next damp with warm water, when the metal and veneer may be easily detached, and we now have two designs in the different materials, and the desired effect is produced by mingling the brass and ebony, the cut-out portions of the brass being inserted in the ebony background, and *vice versâ*.

This is accomplished by gluing upon a suitable foundation of some hard wood, as in veneering, again pressing, and when dry cutting out your frames, etc.

The surface should then be rubbed down with a flat pad—*i.e.*, a small piece of perfectly flat wood, round which is rolled a linen cloth; using emery flour and oil, and finishing with rottenstone.

The result will be that we have two articles, the one with brass design upon ebony, and the other ebony upon brass; a thin coat of varnish will complete the job, and prevent the brass losing colour.

8.—Artificial Marble.

A substance which shall resemble marble or alabaster, and be found useful for various purposes, may be made as follows:—

Mix fresh plaster of Paris with a strong solution of alum and water into a smooth paste, and bake in an oven till hard; when cold grind to fine powder, and mix with water. At this stage any dry colour may be mixed with the plaster in such a way that it shall run in streaks but *not* get thoroughly incorporated with the mixture. Now run into mould, and when set again bake, and when hard and cool dip in skimmed milk, dry, and polish with soft cloth and French chalk.

HINGES:

THEIR VARIETIES AND APPLICATION.

BY DAVID ADAMSON.

II.—Another Mode of Hingeing a Door.—Forms of Hinges.

Having in the preceding article named one way in which a door is hung and hinged, another method of doing so may now be instanced. Those who have paid the slightest attention to door fitting cannot have failed to notice that, instead of the door being within the ends or framing to which it is attached, it is often found covering these or outside of them. A very common example is in an ordinary wardrobe with sliding trays, and another in the small drawer pedestals on top of a "registered" writing table. In the latter the drawers are secured by a small hinged slip of wood which, for the present purpose, may be regarded as a door. Now it is obvious that were the door in such cases as these fixed as already described within the ends, the trays in the former and the drawers in the latter could not be drawn out. The hinged edge of the door would stop them. Of course, the end by the door may be, and often is, thickened up to allow of the drawers sliding, but then this naturally means that the length of the drawers is curtailed by at least the thickness of the door framing. If any doubt is felt about this explanation, a slight examination of a few articles of furniture will make it clear. It is an ordinary method of construction in sideboards of modern style. If two or three of these are examined, the pedestal containing the cellarette is almost certain in one, if not all, of them to be blocked to allow of clearance. I have said "almost certain," but I may go further and say positively certain if the door is hinged *within* the ends, so that a glance at the door will show whether the inside of the pedestal will answer the inquirer's purpose. With such a construction, however, we have nothing further to do at present, and it has only been named in order to indicate how the desired object may be attained by hingeing the doors on the end, and to make the reasons for such an arrangement clear. It must not, however, be supposed that it is only applicable when there are drawers and trays. Many reasons govern the causes why it is sometimes to be preferred, but it will be unnecessary to consider these, as it may fairly be supposed that the worker, when he understands the principles of both methods of hanging doors, will be able to decide for himself which he prefers. As a general rule it may, however, be said that doors should not be hung on the ends when it is necessary to cut away the thickness of the door frames from these, and leave an overhanging part, as, for instance, when there are drawers above the door, not behind it. Thus sideboards often—indeed, generally nowadays—have drawers above the doors, and it is for this reason the doors are within the ends. When, however, the door goes up to the top, or, as in the case of a wardrobe, runs right up to the frieze or cornice, there is no reason—at least as far as construction is concerned—why the door should not be hung on the ends. For the rest it is simply a matter of design, for no one, I imagine, would, unless from some very exceptional cause, wish to make a sham pilaster to move—that is, to form part of the door. To show more clearly when it would be right and when wrong to hinge a door on the ends, Figs. 4 and 5 are given illustrative of the foregoing hints. I trust these are made so clear that the amateur need not feel perplexed as to which construction he ought to adopt for anything he may make. Nor, I may add, will he vex the soul of the art furniture designer who knows his business by requiring him to "make up a lie in wood."

It is just as well to understand why and when to prefer one form of construction to another, so supposing we wish to hinge a door *on* the end, let us see how to do it in a workmanlike manner. Most of the work is done just as already described, the chief point of difference being that the hinge must be sunk in the end with, of course, the joint outside as before. The mode of fixing and general regulation are the same, but if

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anything, rather more care will be required to see that the bottom of the door does not drag. The edge of the door frame should be flush with the external surface of the end, and the hinge pin be in the same relative position as before. As an illustration has been given of the door hinged within ends, one (Fig. 6) is given in the same form for purposes of comparison, which will render any further explanation superfluous, especially as the letters refer to the same parts in each.

So far only the ordinary butt hinge has been referred to, but there are many modifications which come in useful at times, and though no detailed directions concerning the fitting of any of these need be given, a few of the varieties most commonly required may be named. It must, however, be understood that these are what may almost be called "articles de luxe," and if it is not thought worth while to avail oneself of them, they may generally be dispensed with, and the ordinary butt be substituted by a little ingenuity, though perhaps at a sacrifice of appearance. Try the effect, for example, of allowing the knuckle of the hinge to project further than stated, and it will be found, of course, that as the centre or pivot is further from the front the swing of the door is altered. Now it is easy to understand that in many instances—such as with carriage doors, where, owing to their curve, the pivot could not be fixed close up, as in the case of the doors described—a hinge which will allow of more throw must be used, by which all the centres can be got in one straight line, or when a door must swing clear of a moulding. For these purposes, therefore, there are hinges with comparatively wide flanges and screw holes bored near their edges. In addition to straight hinges of this kind, as shown in Fig. 7, they are made with the flaps bent. Figs. 8 to 12 show specimens, but there is such an immense variety of these cranked hinges, as they are called, that it is not possible to give anything like a complete list. Nor is it necessary, as they will seldom be required by the amateur. Indeed, the same may be said of almost all the fancy hinges, or those only used in special trades like the carriage hinges mentioned above. Probably, therefore, it will be sufficient just to name a few of the better known kinds, or those likely to be of more general use. Let us take first the heave-off hinge, the construction of which will be readily understood from the illustration (Fig. 13). From this it will be seen that the flaps are easily separable, and consequently a door or lid hinged with them can be removed without the necessity of unscrewing the hinges. A familiar example of their use will be found in Lancaster's original patterns of cheap cameras, which, it will be remembered, are fitted with them, one half of each hinge on the bottom board, and the other on the casing of the bellows body. Then there are the "stop butt hinges," which can only be opened half way, or to form a right angle, as in Fig. 14, instead of flat. These, of course, are very useful for fixing on box lids with, or a door which it is not intended should swing too far.

Sometimes with a heavy door it is desirable to use a hinge with one plate broader than the other, as in Fig. 15, the extra width of one flap allowing a greater "grip" to be taken on the wood than when both are narrow or only the width of the thickness of the door frame. These are known in the trade as wardrobe hinges. I think mention has been made that sometimes each

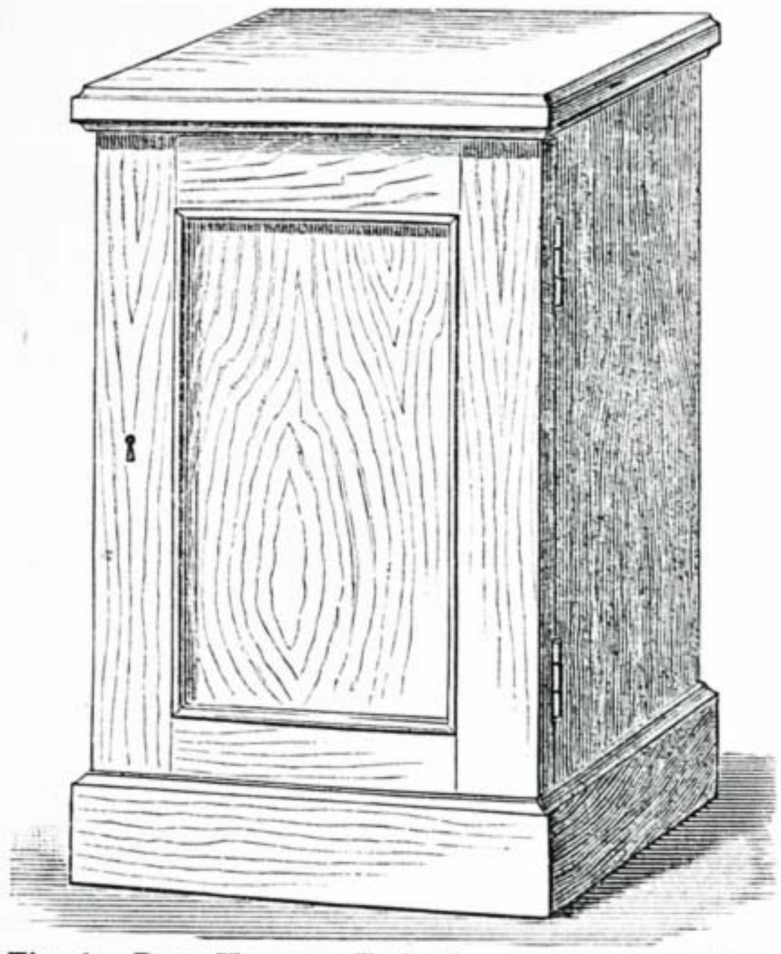

Fig. 4.—Door Hung on End: Correct Construction.

part of a hinge is sunk within the wood, and it may be said here that in furniture this is seldom done except when the weight of the door is so great that any additional support gained is required to relieve the downward drag on the screws. Both hinge plates being sunk this is reduced to the minimum. In Fig. 16, a hinge with plates

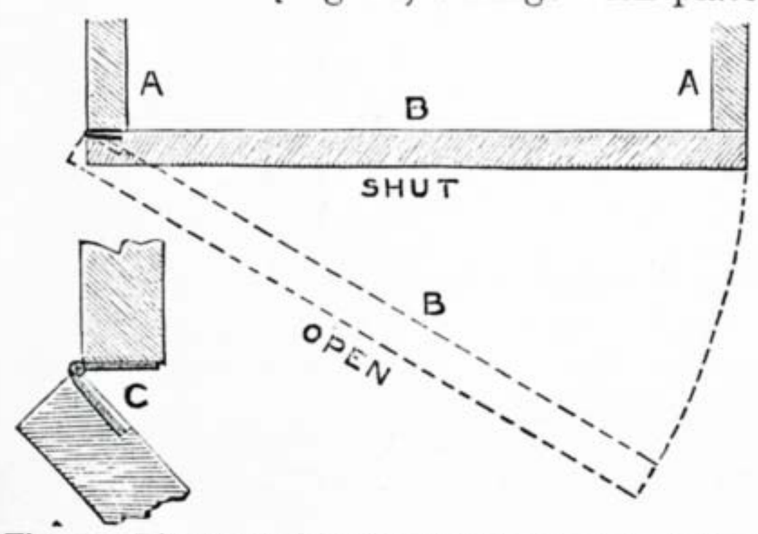

Fig. 6.—Diagram showing Door Hinged on End. A, A, Ends. B, Door. C, Enlarged View.

thickened to form a shoulder against the wood is represented; but they are seldom used, although their peculiar construction gives an appearance of great massiveness, besides other advantages in some cases. Another and more ordinary way of giving a slightly ornamental or more finished appearance to the hinge is by means of

Fig. 5.—Door Hung on End: Incorrect Construction.

small knobs at the ends of the pins. These hinges are generally used in the better class of furniture, and should be inquired for as knob hinges or tipped butts. No difficulty will be experienced in recognising them from the illustration (Fig. 17), but it should be said that there is a large variety of patterns to which the knobs are made; for example, in a catalogue before me there are about thirty of them. As a rule it may be stated that knob hinges are generally well made and carefully finished, so that the apparently high price of hinges of this class is not caused solely by the knobs, but by the general quality.

But we must now take leave of the butt hinge for the present, and turn attention to other kinds. Perhaps next in order to it for general utility is that known as the "back flap," of which an illustration is given in Fig. 18. From this it will be seen that the proportions are quite altered, the plates instead of being long and narrow being wide and short. This indicates that their peculiar function is to connect two flat surfaces which it may be desired to hinge in such a way that they may be level when the hinge is opened out. A common use to which they are put in furniture is in the construction of flap tables, *i.e.*, tables which may be enlarged or diminished in size by raising or lowering a flap. The hinge plates are let into each piece of the table on the underside with the knuckle downwards, or the reverse way to that shown in the illustration. Another instance of their use may be seen in the old-fashioned bureau. In nearly all of these this kind of hinge is used to connect the lid or writing table part with the carcase. The hinge then is let in on top with the rounded joint upwards. From these two instances there ought to be no difficulty felt by the greatest novice in knowing in what cases to use the "back flap," and it is hardly too much to say that with either the "butt" or this, almost anything may be hinged. All others may be looked on as modifications of these. Take, for instance, the "portable desk" or "bagatelle hinge" shown in Fig. 19. It will at once be seen that this is nothing but the back flap hinge greatly narrowed in the direction of the knuckle with long, projecting plates. As I daresay is well known, and as its name indicates, this form is used for small writing desks and folding bagatelle tables, the long, narrow plates being sunk into the edges of the sides of these so that only the rounded part projects above the surface. Another variety of these hinges is shown in Fig. 20.

A distinct form of hinge is found in card-table or counter hinges, which may be used with advantage whenever it is not desirable to have any projecting knuckle. Fig. 21 is typical of them all. The flaps, it will be seen, are connected not by a pin running through them, but by a separate plate which is pivoted to each of them. As with all other hinges these vary considerably in detail, some having only one connecting piece, some two, and so on. It is, however, unnecessary to specify these, and after what has been said any remarks about fixing them are surely uncalled for. Without, however, giving numerous illustrations of these hinges, it will not do to pass over a distinct form for the same purposes, and known by the same name. This variety is shown in Fig. 22. The only special mention they require is that being fixed to the ends of the pieces they connect—not to the surfaces—they are used in pairs only. Therefore for very long joints, which, however,

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seldom occur in amateur work, they are not always desirable. Closely allied to the card-table hinge, among which they may be classed, are those like the one shown in Fig. 22, a form very convenient for attaching the folds of a screen or similar purposes. The plates are of course sunk in the top and bottom edges of the framing. It must not, however, be inferred that they cannot be used in other situations, or that they are suitable for screens which are intended to fold in any direction. When this is required the regular screen hinge must be used. These are perhaps the finest and most ingenious of the various kinds of hinges usually met with, and this is equivalent to saying that they are, compared with single-action hinges, expensive. To derive the full benefit from them they must also be very carefully fitted, even more so than in ordinary hinges, but beyond this caution it will be unnecessary to say more about fitting them. The ordinary double-action screen hinge is shown open and closed in Figs. 23 and 24; but there is another very important variety somewhat on the principle of the hinge shown in Fig. 21. To describe their construction and fitting (a somewhat difficult job, by the way) would, however, require more space than can be spared at present, and no doubt for all practical purposes enough has been said by calling attention to the fact of there being such a hinge for those who wish to use it. While treating of fancy or special hinges omission must not be made of the butler's tray hinge, which, however, is seldom required except for the piece of furniture from which it takes its name. It has a kind of what in default of a better term may be called a spring stop, by means of which the sides of the tray are kept upright when required. Their upper surfaces are flush with the wood, without any projecting knuckle. If, however, the tray is made with square-ended flaps, it is not necessary to have this form of hinge, as for the spring stop may be substituted a special catch let into the flaps of the tray. It is, however, advisable to use a hinge which does not, even at the joint, project above the wood.

Occasionally it is considered desirable that the hinges should not be seen, though what objection there can possibly be to a good hinge being visible may be a puzzle to which some of us can give no satisfactory answer. However, the fact remains that some prefer to use a secret hinge, or to give its more ordinary name, a centre hinge, of which a plain one is shown in Fig. 25. It does not occur to me that they are used except for hanging doors, which may either be within or on the ends. In either case their use entails more labour than the ordinary butt hinge, for either the door must be rounded off or a shallow groove for its edge to turn in must be cut in the piece against which it works. Much might be said about this and the general fitting of centre hinges, but they are so seldom used that anything like full directions would only encroach needlessly on valuable space. Should I be mistaken in supposing that the information is not of much use to readers of this magazine, I shall be happy on some future occasion to give all necessary instructions, and the same may be said about any other kind of hinge and hinge fitting.

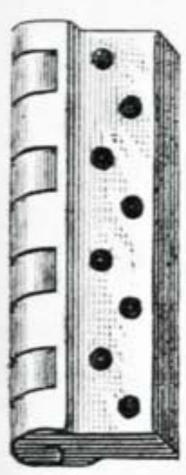

Fig. 16.

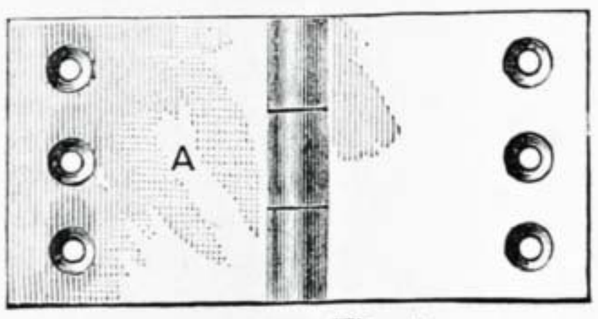

Fig. 7.

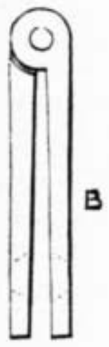

Fig. 8.

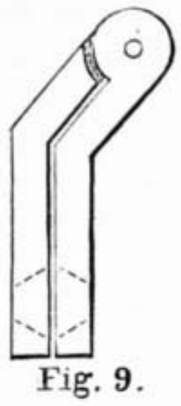

Fig. 9.

Fig. 10.

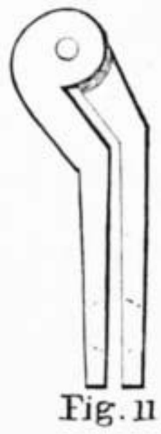

Fig. 11.

Fig. 12.

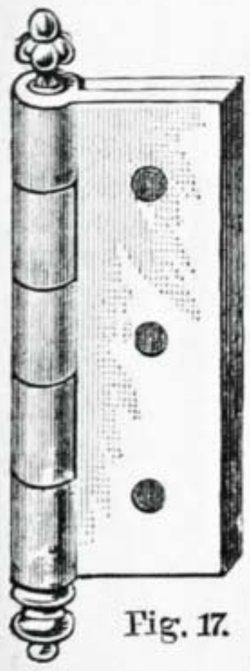

Fig. 17.

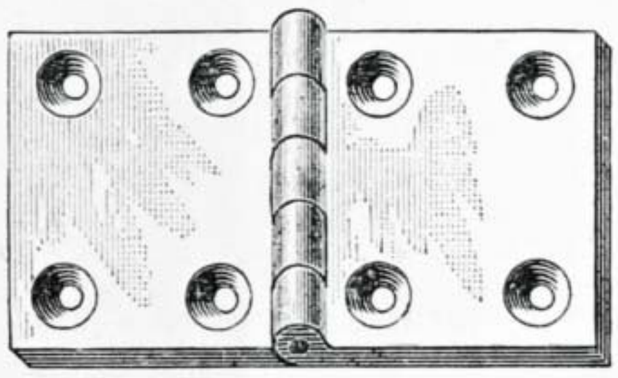

Fig. 18.

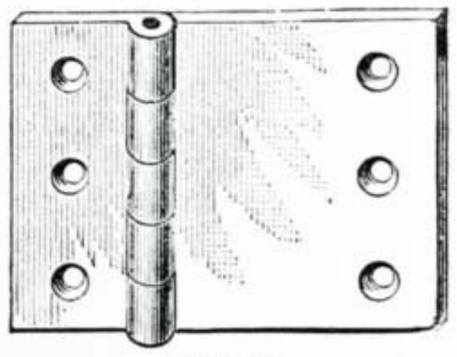

Fig. 15.

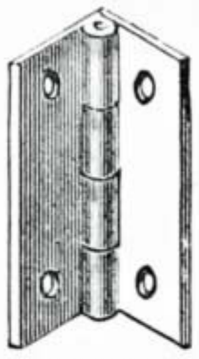

Fig. 14.

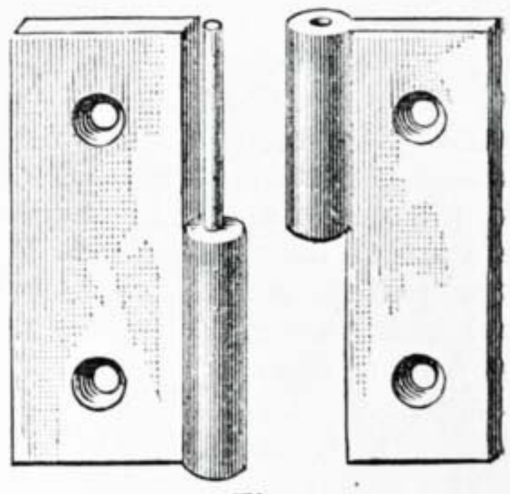

Fig. 13.

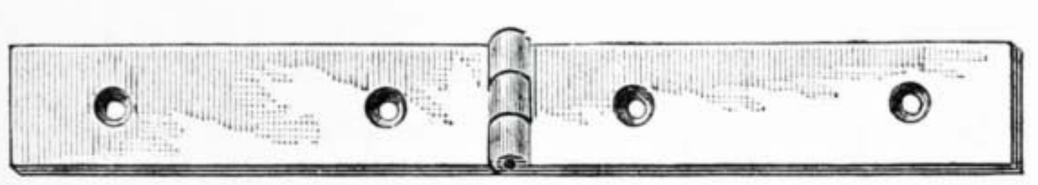

Fig. 19.

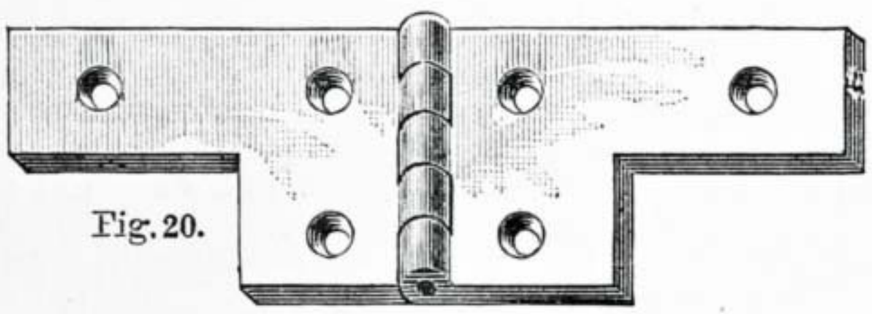

Fig. 20.

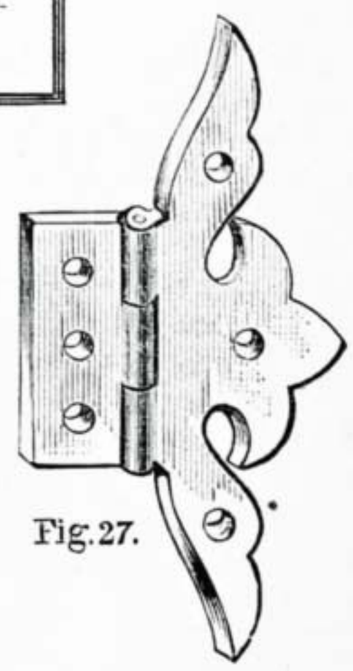

Fig. 27.

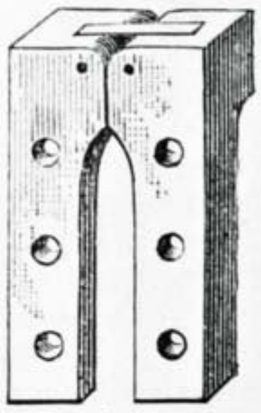

Fig. 22.

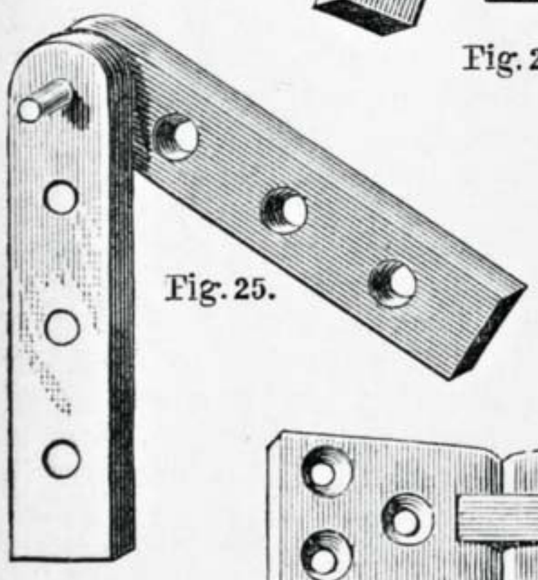

Fig. 25.

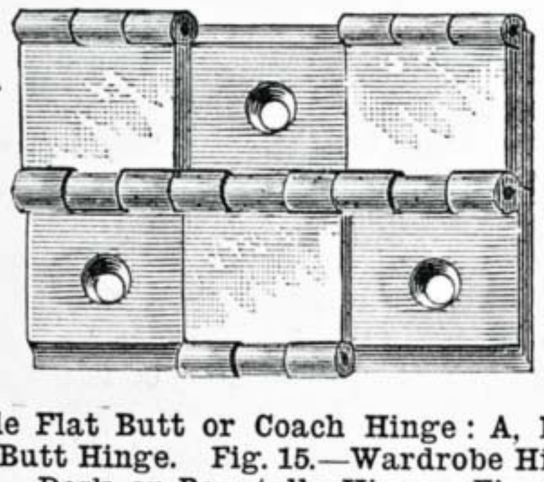

Fig. 23.

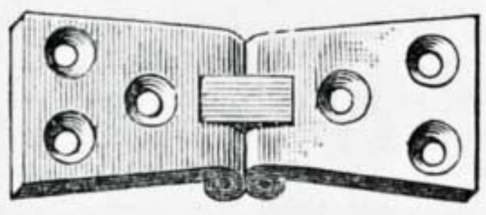

Fig. 21.

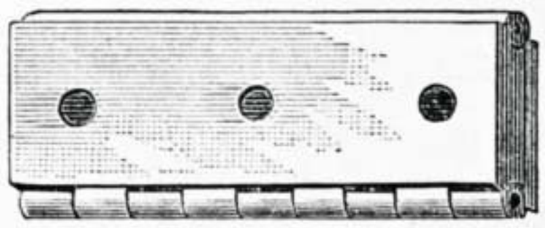

Fig. 24.

Fig. 28.

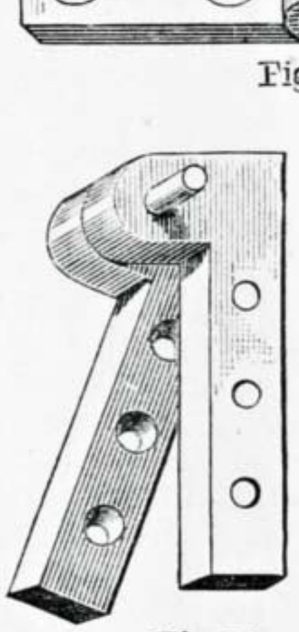

Fig. 26.

Illustrations of Various Kinds of Hinges. Fig. 7.—Wide Flat Butt or Coach Hinge: A, Plan; B, Section. Figs. 8-12.—Sections of Bent or Cranked Hinges. Fig. 13.—Heave-off Hinge. Fig. 14.—Stop Butt Hinge. Fig. 15.—Wardrobe Hinge. Fig. 16.—Narrow Brass Projecting Butt Hinge. Fig. 17.—Knob Hinge. Fig. 18.—Back Flap Hinge. Fig. 19.—Desk or Bagatelle Hinge. Fig. 20.—Ditto: another Form. Fig. 21.—Card-Table or Counter Hinge. Fig. 22.—Ditto, for Fixing on Ends. Fig. 23.—Double-Action Screen Hinge: Open. Fig. 24.—Ditto: Closed. Fig. 25.—Centre Hinge. Fig. 26.—Cranked Centre Hinge. Fig. 27.—Ornamental Hinge. Fig. 28.—Hinge Plate.

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At present I must content myself with saying that great care must be used to get the projecting pin seen in the illustration correctly centred in the door frame. One part of the hinge, of course, is let into this, and the other into the wood above it. These centre hinges are also to be had "cranked" or bent in a variety of ways, one of which is shown in Fig. 26, in order to suit different kinds of doors and throw them back as may be desired. A few years ago these centre hinges were much used for wardrobes, and there is perhaps this to be said in their favour, that when the construction of anything seems so ashamed of itself that it wants to look like something else, or in plain English, a sham, the centre hinge is an admirable contrivance. But with all this, occasionally it may be used with advantage; all I want to impress on those who have no very definite ideas about propriety in construction is, not to make use of the centre hinge unless there is some better reason than the false notion that a hinge is an ugly thing in itself, and should be kept out of sight when possible. This leads me to say that a hinge may really be made a very ornamental adjunct to any piece of furniture by using a strap hinge, in which the flap is placed outside. Some made for this purpose are highly decorative, but the same effect may be gained by the use of hinge plates, which are merely pieces of ornamental brass. They are screwed on to, say, a door, close up against the hinge, to which they must, of course, be equal in length. If there is any other brass work, such as handles, about a piece of furniture, it is desirable that the hinge plates should correspond with these in general design. Fig. 27 gives a complete hinge with ornamental flap, and Fig. 28 shows a separate plate. Both of these are reproduced from Messrs. R. Melhuish & Sons' admirable catalogue, in which several ornamental hinges are pourtrayed.

In addition to the hinges of which mention has been made, there are a large number of others used principally by builders, or at any rate in building construction, and differing in shape as well as in size from those used in cabinet work; but space forbids for the present more than this passing notice, and any remarks about them must be deferred.

NOTES AT THE ARCHITECTURAL AND BUILDING TRADES' EXHIBITION, 1889.

It may seem to some that such a display as the above would only appeal in interest to the thoroughly practical man. The title, "Architectural and Building Trades' Exhibition," brings to the mind of many people visions of nothing but bricks, mortar, and sewer pipes, interspersed, perhaps, by way of variety, with chimney shafts and roofing tiles, and they hold aloof therefrom in consequence. It is, however, only necessary to give the matter a minute's thoughtful consideration to effectually dispel such an illusion; for, with the immense progress of modern times, there have been produced a thousand and one contrivances, in connection with our houses, which are of the greatest interest to one and all alike, indispensable as they are to their daily comfort. Our habitations are, nowadays, from the front door to the roof, fitted with innumerable inventions calculated to increase the comfort and, what is more important, the safety of the people who live therein, and to those whose desire it is to be up to date in their knowledge of such matters, a visit to the Agricultural Hall, during the period in which the Building Exhibition is held, cannot but be profitable.

For the benefit of those, however, who, by reason of time and circumstances, have been unable to go in that direction, a few notes on the most interesting and useful exhibits there may be welcome; and to that end we took an opportunity to visit the Exhibition and review the goods to be found therein.

As the most usual and generally accepted way of entering any house or building is through the door, it is fitting that inventions connected with that piece of wood work shall be considered first, and of these there were shown many possessing great practical utility.

Mr. Robert Adams, of 67, Newington Causeway, S.E., had, in his exhibit, a variety of contrivances associated with the opening and closing of doors, which showed the strides made in that direction of late years, and of these, the "Victor" spring hinges were, perhaps, the most admirable. These hinges are, of course, more adopted in public buildings than in private houses; but there are few people who have not, at one time or another, to use doors so fitted. Some forms of the "Victor" hinges are, doubtless, well known to our readers, but there is a development of the action which has been recently introduced, and which demands notice. It is styled the "New Crown Victor Silent and Non-silent Patent Double-Action Door Spring Hinge," and is certainly one of the most compact hinges of its kind. The mechanism is so contrived as to be always compensating, the result being that no slackness can arise from wear; and one of the principal objects of it rests in the fact that the weight of the door is so provided for, that it cannot possibly cause the pivot to wear, thus precluding any likelihood of the heel of the door rubbing against the hollow of the frame. The "Hurricane" spring hinge, also by the same firm, is so arranged as to resist any force of wind in exposed positions, and yet to allow of being opened by a child in an opposite direction.

Certainly, one of the greatest difficulties in the domestic routine of the household is cleaning the outside of upper windows; and it sometimes really makes one shudder to watch the acrobatic feats of servant girls on a high, narrow window sill. To provide for this, and, indeed, entirely remove all danger from the operation, the new sash gear, from the hands of the same inventor, shows what appears to be a perfect solution of the question; and were it employed more generally in extensive buildings, the number of accidents which one hears of from time to time would considerably diminish.

In the same direction, Messrs. Hill and Hodges were showing a floor spring hinge which they are putting into the market; and for bank, lobby, and other double-action spring doors, its efficacy seems indisputable. The main point with regard to the hinge in question is that, instead of having an ordinary square or pivot, it has a solid arm on its axis or pivot, which projects on end; and the advantages accruing from that arrangement certainly call for notice from those who have to do with such matters.

From the door to the hall is but a step, but in that short distance there arise new requirements and necessities, which have called forth multifarious inventions. In the entrance halls of houses of a more pretentious character, floor-cloth, linoleum, and carpeting have given way before that description of flooring known as parquetry. That such should be the case cannot for a moment be wondered at, for good parquet is characterised by a durability, evenness of surface, and beauty of appearance, which combine to make it a powerful rival to other materials of a softer description. To those anxious to discover how far the manufacturers of that particular flooring have extended their operations, the exhibit fitted up by Turpin's Parquet Floor, Joinery, and Wood Carving Company, of 22, Queen's Road, Bayswater, constituted a good index by which to judge. With some people, the one great objection against the adoption of parquet flooring has been its expense, but with the ever-increasing capabilities and improved facilities possessed by makers to-day, it is being brought more within the reach of all; and one thing is certain, housewives will be the first to welcome the advent of such a decorative and highly sanitary flooring. Of the latest of Messrs. Turpin's productions, the patent thin parquet flooring is, perhaps, as important as any. This latter quality is $\frac{5}{16}$ths of an inch thick altogether, including ornamental pattern and backing; the latter of which is made of either one, two, or three wood laminations, laid crossways of the grain of the wood at right angles. By that means, the thin parquet is rendered as strong and durable as that 1 in. in thickness, and is capable of resisting the strain of heavy bodies placed upon it, without any ill effects whatsoever. As must be apparent to those who are compelled to study economy, and yet desire to embellish their houses in that direction, this latter description appeals very strongly; and the fact that it can be removed at pleasure from the under flooring, without either sustaining any damage, is an additional commendatory qualification. In these days, when bad, "puddingy" carving is so rife, to see really good cutting is refreshing, and it is only due to say that several panels shown by Messrs. Turpin were of the highest order. Some dado panelling, also emanating from the same workshops, called up the "good old times" when wood-panelled rooms were more in vogue than they are to-day.

Mr. Henry Bassant, of 87, Charlotte Street, Fitzroy Square, further represented the parquet industry; and good workmanship, combined with artistic judgment, characterised the selection to be seen on his stand. Up to a very recent date, the patterns worked out in parquet were somewhat restricted, the difficulty of disposing the blocks of wood in free decorative schemes being no small consideration. Now, however, designs are being produced which show that the difficulty specified is giving way before modern improvements; and many patterns shown by Mr. Bassant were of a really free and artistic character.

From the floor to the walls is the next most natural step, but, strange to say, what is technically known as the "decorating" section of the building trades was left almost entirely unrepresented in the recent display. There was, however, one exhibit of great interest to those who study the development of wall decoration. It consisted of a new Cordovan leathern wall decoration, styled "Calcorion," manufactured by the "Calcorion" Decorative Company, Limited, Addison Works, Woodstock Road, Shepherd's Bush, W., and there is no uncertainty in predicting that it will be sure to find favour in the eyes of high-class

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decorators. The rare beauties of old Spanish leather hangings, authentic examples of which are now so scarce, have been expatiated upon by painter and poet; and when one looks at such rooms as are to be found in, for instance, the Musée Plantin in Antwerp, it is impossible not to regret, in a measure, the disappearance of that material from our walls. It is to satisfy this want that "Calcorion" has been devised; and certainly, as far as appearance goes, it seems fully qualified to do so. From an economical point of view, the new wall covering would not, perhaps, find favour everywhere, although the simpler designs are reasonable in price. Economy is not, however, quoted as a qualification thereof, and the more elaborate schemes of decoration, worked out in that material, are altogether *recherché*, and would grace the highest palaces in the land. In texture, "Calcorion" is much akin to leather, and when embossed and decorated, it would require an experienced connoisseur to detect the difference. Its natural colour is buff, but, as may be readily understood, a pattern embossed on it may be treated in any colours that may be deemed desirable, thus allowing great scope in treatment. It is manufactured in pieces of 12 yards length and 36 inches in width, and the method of affixing it to the walls is much the same as that employed with other thick materials of a like description, strong paste being the chief factor in the operation.

Further continuing the decorative line of thought, a fine ceiling in fibrous plaster was shown by the Hitchins' Fireproof Plastering Company, Limited, 1, Gresham Buildings, Basinghall Street, E.C.; which served to further substantiate the claim of that material for use in extensive schemes of decoration. Fibrous plaster is, by this time, so well known, that to lengthily describe it here is unnecessary, but there are one or two improvements introduced by the above firm to which attention must be drawn. What are termed wirework slabs, that is to say, a thickness of fibrous plaster, having through the centre, and forming a foundation, a square of wirework netting, form a new feature; and, from the method of their manufacture, are absolutely fireproof in every respect. By the use of that description of slab, the necessity for ordinary lath and plaster is avoided; and, in addition, the work can be painted, papered, and finished within a very short period of completion.

Architectural wood work, as might be surmised, played an important part in the year's show, and among those manufacturers of wood mouldings for interior decoration, Mr. Samuel Elliott, of the Albert Steam Joinery and Moulding Mills, Newbury, exhibited a choice selection. In this section, again, we find the influence of modern progress, for, whereas in days gone by a skirting board and cornice moulding were deemed sufficient, nowadays, dado and picture mouldings are indispensable, and the industry has undergone further development in consequence.

It is often the case that the beauty of an interior, especially one of a less elaborate character, depends on the sharpness and disposition of the mouldings employed in it, and for the architect to have such a selection to fall back upon as that shown by Mr. Elliott is half the battle. Mouldings in oak, walnut, and other woods served to show that manufacturer's capabilities in that direction, and also gave the uninitiated an idea as to the development of that particular branch of wood work.

Another excellent display of turnery, joinery, and interior wood work came from the Keighley Timber and Saw Mills Company, of Lawkholme, Keighley, Yorks., and the north country certainly could not have sent to town better representatives.

As a selection of high-class joinery and turning it was to the fore, and such indispensable factors as balusters, skirtings, mantels, windows, and examples of panel work were shown by that Company, and went to prove conclusively that a builder nowadays is not under the least necessity to send abroad for his wood work, as some seem inclined to think that they are.

Another stand of a similar character was that of Messrs. L. W. Ransom and Company, of the Britannia Works, Kensal Road, W. Staircases, handrails, newels, balusters, scrolls, wreaths, caps, etc., were there to be seen in abundance, and indicated that the requirements of the trade are well understood and studied by those wood workers.

The importance of the window-cleaning difficulty, already referred to, is so great that numerous inventors have made it the subject of study, and of those the "Millar's Patent Reversible Window Company" offer an admirable solution of the question. Windows fitted after the manner shown by that firm can be easily reversed—that is to say, the outside brought inside—by anybody, and any necessity to sit out on the sill is completely done away with. A more practical and admirable arrangement few would desire, and the combination of simplicity with perfect efficiency is there successfully accomplished.

When one compares the gasfitting and general domestic metal work of to-day, more particularly in the way of chandeliers, gas-brackets, etc., with that of years ago, the result is decidedly satisfactory; and people are, fortunately, beginning to appreciate the fact that metal work, in the hands of an artist, is one of the most charming materials for decorative purposes. The idea entertained by some, that to be a metal worker is lowering, is fast being dispelled, and the world-wide reputation made by Quintin Matsys at the forge is proof enough as to the absurdity of that notion. Indeed, one of those artificers in metal who exhibited (Mr. A. G. Hamilton), has called his works "The Quintin Matsys' Forge," and it was gratifying to observe that the work shown by him was of such a high class that the great master himself would not have taken exception to it. To attempt to describe all the knick-knacks on his stand would be futile, but we may briefly say that several standard lamps and hanging lanterns in wrought iron by that maker were equal to any being produced. Some gong stands in the same material constituted rather a unique speciality; and one or two decorative wrought iron kettle stands were of a character to elicit admiration from the artist and the housewife alike. There is a sturdy grace associated with wrought iron work which appeals to our English tastes, and to those who love to see the imprint of the workman's tool on artistic productions, the study of that special branch of metal work is full of enjoyment.

Electricity as applicable to the house received a full share of attention, and of those who make a special study of that branch Messrs. Verity Bros., 137, Regent Street, had fitted up a most interesting display. To those who consider the electric light inapplicable to the private house the stand in question would have been a revelation, for chandeliers, or, to speak more correctly, electroliers, side brackets, standard lamps, and others, all illuminated by electricity, were the most incontestible proof of the way in which that wondrous fluid has gained ground. A somewhat recent invention shown was a combination of gas and electric fittings, so arranged that a bracket could be used for either purpose at will, without any difficulty or alteration. Messrs. Verity also exhibited specimens of their wrought iron work, which was of the highest class, and, indeed, did space permit, their stand invites further description; but we must proceed.

One of the most important and extensive sections of the Exhibition was that devoted to machinery, and it is in that department, above all others, that the stamp of modern progress is most unmistakably affixed. Machines for this purpose and that purpose, for making bricks and executing the most delicate mouldings; mechanical contrivances from a steam engine to a fret saw, all demanded attention; but to attempt to particularise one tithe of the good qualities claimed for them would be folly. A cursory glance is the most that is possible in such a connection; and to start with motive power, Messrs. Crossley Bros'. gas engines took a high place. The "Otto" gas engines are far too well known to require comment here; and any one visiting the Exhibition who desired testimonials as to their reliability had only to glance up at the array of prize medals shown, and doubt was set at rest.

Following in the same line, Messrs. J. E. H. Andrew and Company, 80, Queen Victoria Street, London, showed several of their "Stockport" and "Bisschop" engines, and the best test of their quality was the manner in which they fulfilled the duties allotted to them.

Messrs. Dick, Kerr, and Company, 76, Queen Victoria Street, had an array of their "Griffin" engines working away, and to judge from such a collection as was there shown they fully justified the description given of them.

Of wood-working machinery the display was large and satisfactory, and whether the visitor was an amateur or artisan there was sufficient to interest him for a long time.

Messrs. J. Sagar and Company, of Stone Dam Works, Halifax, showed by their exhibit that they have a perfect grasp over the manufacture of all branches of wood-working machinery, and to adequately review their stand alone would fill a small volume. Of the machines at work there, the "Self-contained" band sawing machine, the "Premier" combined hand and roller feed panel, etc., planing machine, and the "Hand-planing and trying-up machine," were some of their latest productions, each possessing qualifications which go far to recommend them for high-class work. Fret saws, from the simplest to the most elaborate, were in active operation, and one particular machine, constructed to work with either strained or unstrained saws, at pleasure, attracted much attention. The "Variety" wood worker is the style and title of another contrivance from the Stone Dam Works, and as it successfully performs the operations of planing, sawing, moulding, grooving, jointing, rabbeting, squaring, chamfering, tenoning, mortising, and boring, the name is certainly fully justified.

Machines of a great diversity appeared in the stands adjoining, but space will, unfortunately, not permit their description on this occasion.

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OUR GUIDE TO GOOD THINGS.

30.—THE C. H. M. IMPROVED FLOORING CRAMP.

NOTICE has been taken in this part of WORK of some lathes, lathe chucks, and excellent tools of various kinds used for ornamental turned work and in joinery. Our attention is now turned to appliances that are different in character to those which have just been mentioned — appliances that are chiefly useful in building and carpentry strictly so called, and which may be termed the C. H. M. specialities. This, at first sight, appears a somewhat singular and quaint distinction; and many, perhaps, will be puzzled for a moment to determine what C. H. M. may mean. The difficulty, however, will vanish when they are told that all the articles to which reference is made, and which are illustrated in this page, are manufactured by Mr. C. H. Matthews, 13, Charles Street, Wolverhampton, who has utilised the initials of his name in this way as a sort of trade mark by which to distinguish goods of his own make from all other goods of a like kind and serving like purposes that may happen to be in the market.

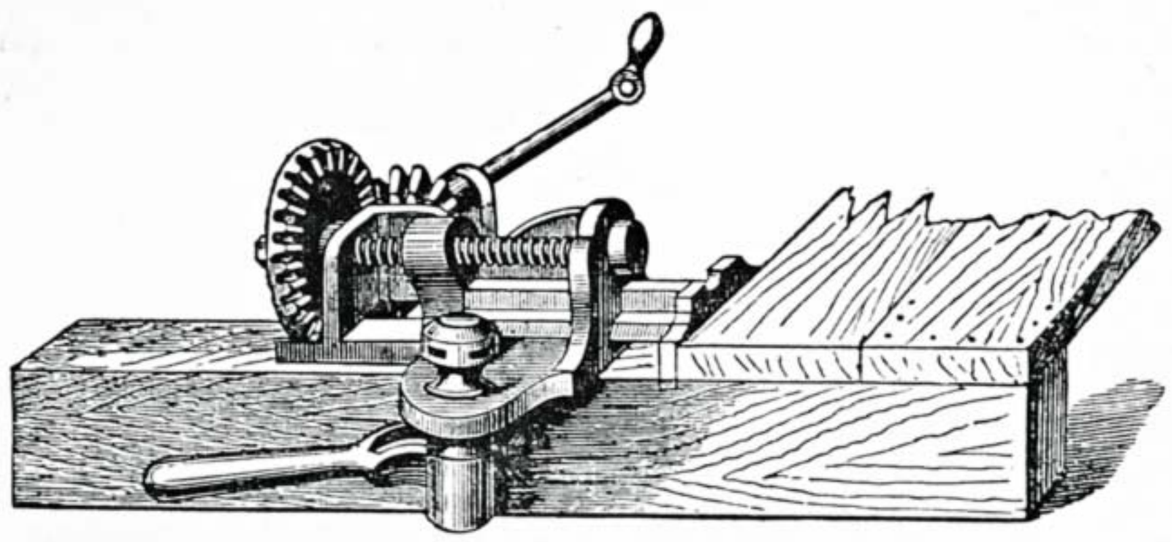

Fig. 1.—C. H. M. Improved Flooring Cramp.

The first of these, the C. H. M. Improved Flooring Cramp, is illustrated in Fig. 1, in which are clearly shown its construction, the manner in which it is used, and the purpose which it serves. It is serviceable in laying down flooring, and by its aid the floor boards are forced into as close contact as possible along their length before they are nailed to the joists. The ends of two floor boards are shown in position on a joist; one of them has been already nailed down, and the other is being tightly jammed against the nailed board by the machine before it is itself secured by nails. The cramp rides, so to speak, on the joist, and is gripped tightly to it by the handle and contrivance shown at the side of the joist. By turning the handle shown on the opposite a bevel cog wheel is turned, which gears into a larger wheel of the same kind, from the centre of which a deeply-cut screw proceeds, whose extremity works freely in a metal plate perpendicular to the joist. The screw works through a piece of metal with a rounded head attached to one end of the bar, which is driven by the action of the screw against the floor boards, exciting considerable pressure, and compelling a close joint between the boards. The cramp is made of malleable castings, and is furnished with wrought iron wormed pins and steel lance-blade teeth. It is light, compact, steady in its action, and serviceable, being formed to grip joists from $1\frac{1}{2}$ in. to $3\frac{1}{2}$ in. in thickness, and by reason of its construction, compressing floor boards with the greatest possible force directly applied. These cramps are sold singly at 21s. each, and in pairs at 40s. per pair.

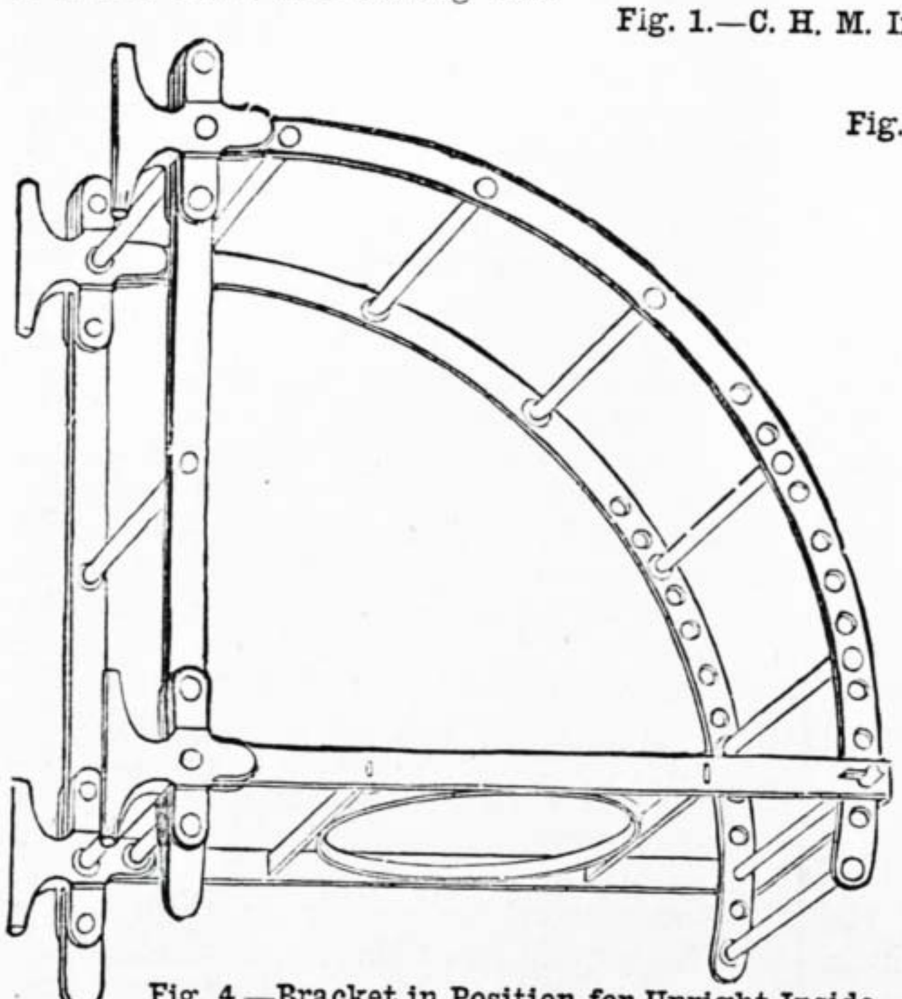

Fig. 4.—Bracket in Position for Upright Inside of Ladder.

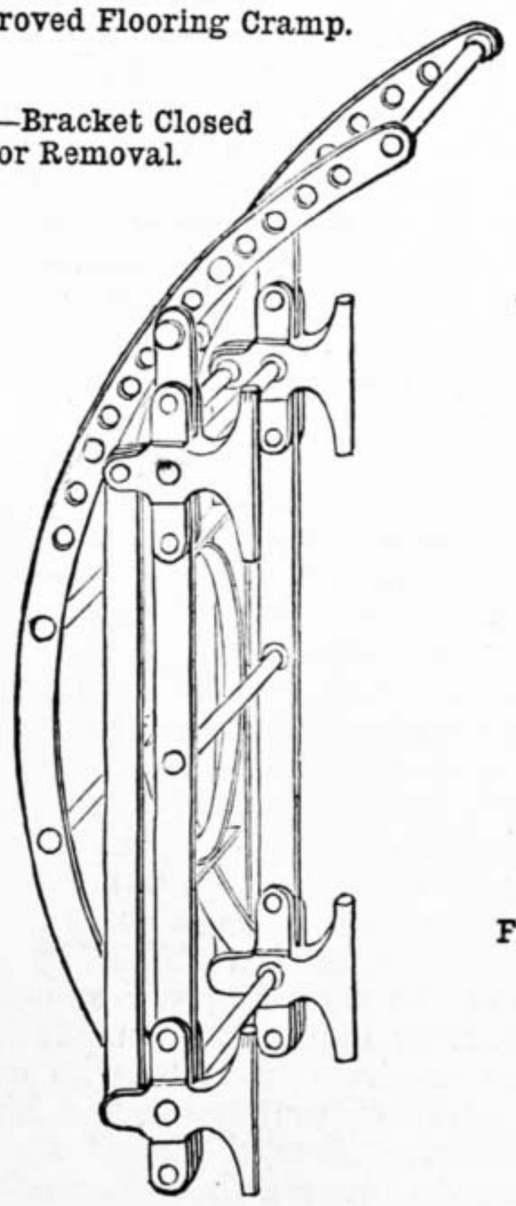

Fig. 5.—Bracket Closed for Removal.

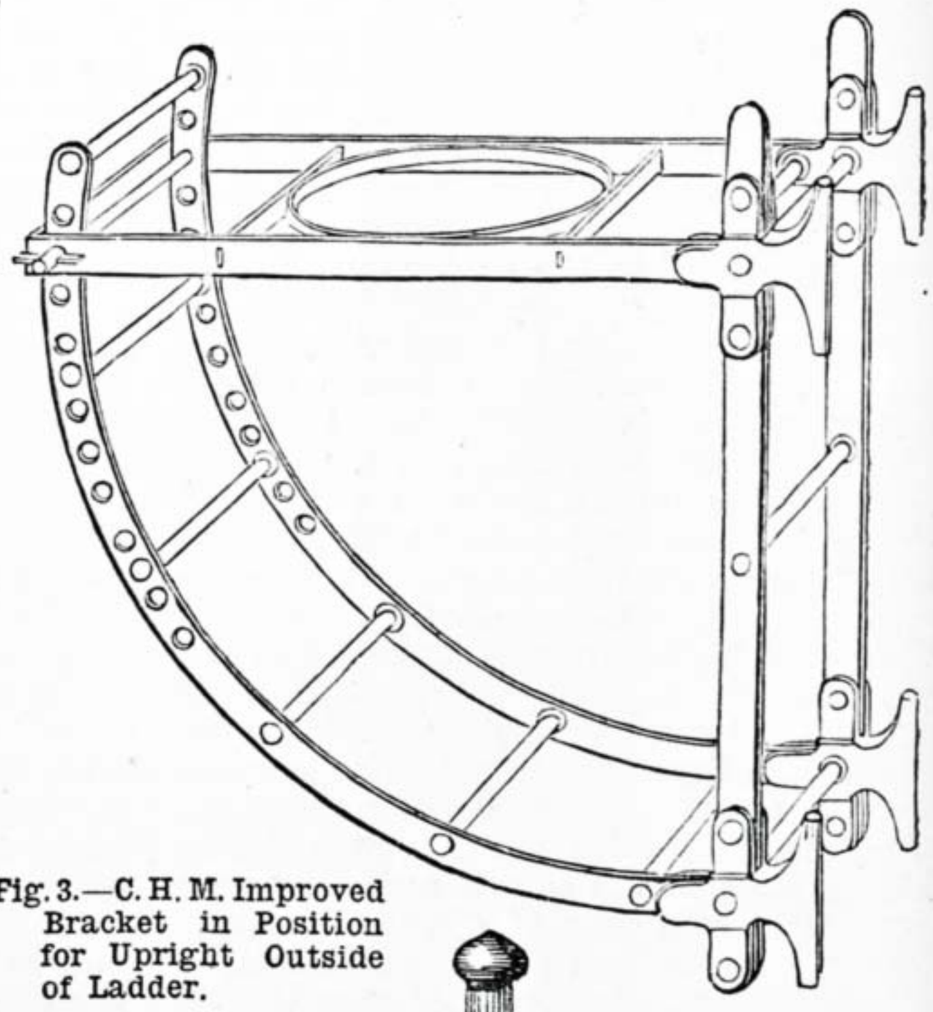

Fig. 3.—C. H. M. Improved Bracket in Position for Upright Outside of Ladder.

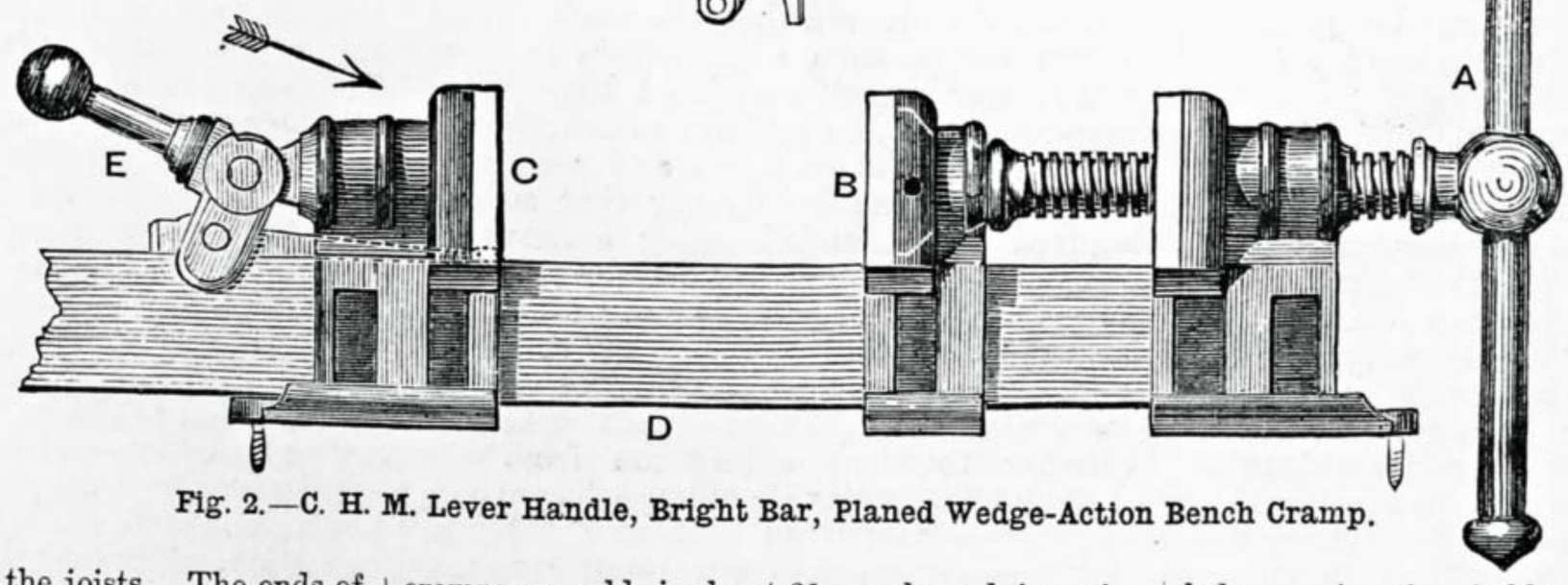

Fig. 2.—C. H. M. Lever Handle, Bright Bar, Planed Wedge-Action Bench Cramp.

31.—THE C. H. M. LEVER HANDLE, BRIGHT BAR, PLANED WEDGE-ACTION BENCH CRAMP.

The Bench Cramp, whose name has just been given in full, differs in many particulars from similar contrivances in general use, but the principle on which it is made and its action are very much the same. Both parts, B and C, are movable along the bar, D, but the portion C may be rendered immovable to resist the pressure of anything impelled against it by the part B. When in work, B is moved towards C, on the bar, D, by action of the screw turned by the bar inserted in the head of the screw at A. The part C, which, as it has been said, is movable, becomes immovably tightened on the bar, D, by depressing the handle, E, and forms a line of support on the bar, D, for direct pressure transmitted from B. Under ordinary pressure, C may be rendered movable by raising the handle, E, upwards with the hand, and under severe pressure a blow in the direction indicated by the arrow will effect this without injury to the cramp. This cramp is made for setting out for joiners, cabinet makers, etc. It is made with bars from 1 in. × $\frac{1}{4}$ in. × 16 in. to 2 in. × $\frac{1}{2}$ in. × 66 in.; sold respectively at prices ranging from 11s. to 50s. Couplings and lengthening bars are supplied for cramps above 48 in. in length, ranging from 48 in. to 66 in., and sold together at prices from 16s. to 24s.

32.—THE C. H. M. IMPROVED BRACKET.

These brackets are made in wrought iron, and are useful for bricklayers, plasterers, painters, etc., when it may be found necessary to form a temporary scaffolding by means of planks and ladders. The brackets may be used with ladders at any incline as far as the perforations in the brackets will admit, and on either side of the ladders. In Fig. 3 the bracket is shown for use on the outside of a ladder, the ladder being upright, and the bracket being hung on it by hooks, which are placed two on one round, and two on the third round below. As the ladder's incline is greater, the bars on which the planks rest must be lowered as shown by the holes pierced on the framework of the bracket. Fig. 4 shows the mode of slinging the bracket from the inside of the ladder; it is, in fact, reversed. Fig. 5 shows the bracket closed for removal. The brackets are strong, light, portable, and safe in use. They are made in three different sizes to suit rounds $1\frac{1}{8}$ in. in diameter and 9 in. apart, and $1\frac{1}{4}$ in. in diameter and 10 in. apart. Prices range from £2 4s. per pair to £3 6s. per pair. Brackets to suit ladders are made to order.

THE EDITOR.

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SHOP:

A CORNER FOR THOSE WHO WANT TO TALK IT.

*** *All Communications will be acknowledged, but Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

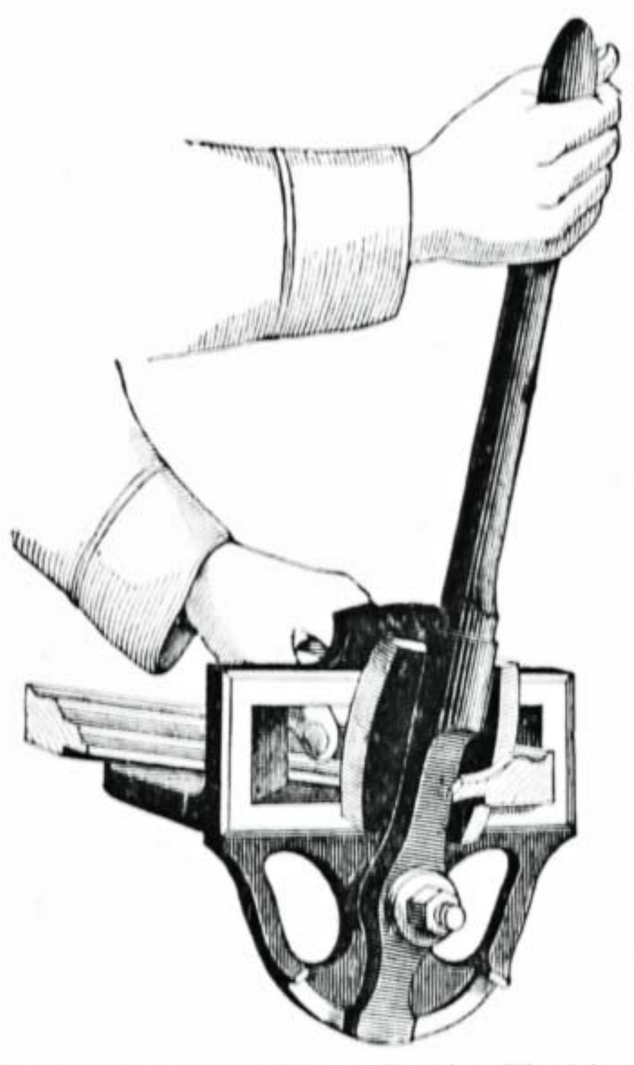
I.—LETTER FROM A CORRESPONDENT.

A Good Word for "Work."—E. D. (*Old Kent Road*) writes:—"It was with pleasure I saw the announcement of WORK in *Cassell's Saturday Journal*, about three weeks before the first number came out. I said to myself, this is the very thing that is wanted, and at once made it known to several of my acquaintances, five of whom have commenced to take it in. I shall continue to make it known as much as I can, as I am sure it will be a great boon to many like myself who are fond of making things, having been an amateur workman for more than twenty years. I am sure it was really wanted. I am also pleased with the article by David Adamson ('Artistic Furniture' in No. 2), not so much for instructing us in utilising old packing cases, which often spoil our tools (new stuff is so cheap that it is not worth while to use old), but for advocating the use of nails or screws in making up work. I have made a good many things in my spare time: tables, chairs, book-cases, cabinets, and overmantles, all of which are screwed and glued, or nailed. I never could make a proper dovetail, it being so difficult, and I am sure that inability in this respect has deterred many from making anything really useful, otherwise than mere ornaments or knick-knacks. One thing I will ask of you: that is to announce any exhibitions of mechanical work, so that myself and others can have time beforehand to send in any articles to exhibit. I wish your Journal every success, which I am sure it will have."—[Thank you for your goodwill towards WORK, and your good words and deeds in its behalf. You must remember that although new stuff may be cheap enough, it is by no means well seasoned, and therefore often inferior to packing-case material, which frequently has this advantage. All mechanical exhibitions of which we may have notice shall be duly announced in WORK.—ED.]

II.—QUESTIONS ANSWERED BY EDITOR AND STAFF.

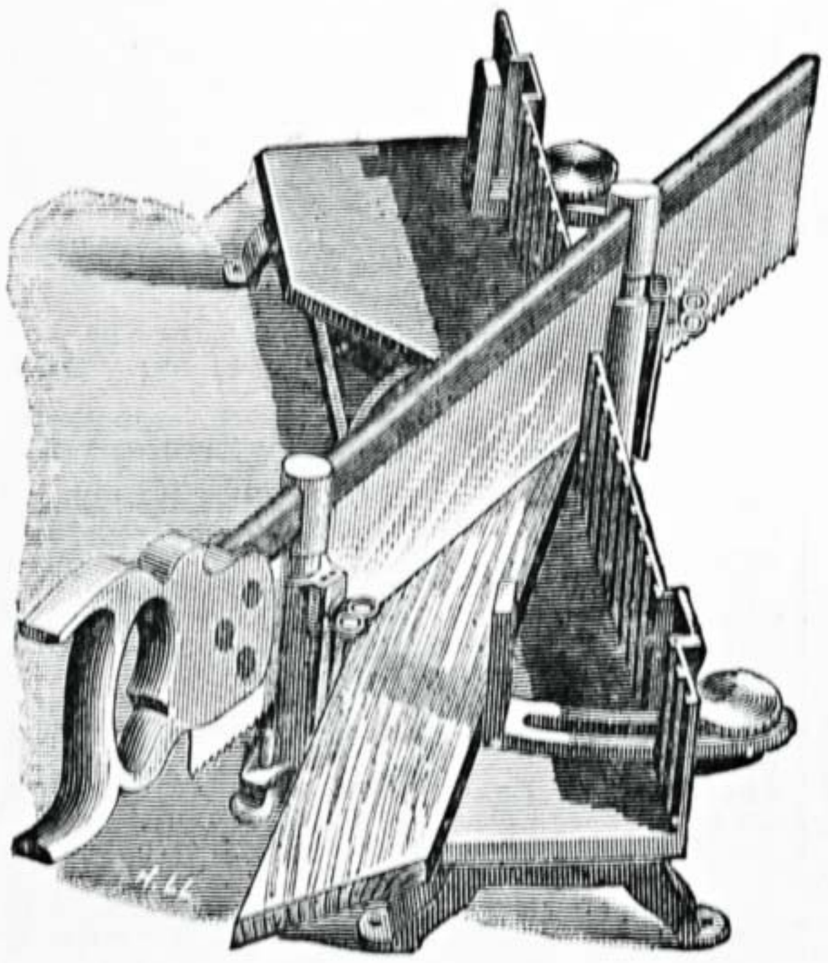
Picture-Frame Making.—W. B. W. (*Liverpool*).—You ask "that some practical illustrations be given as regards the best and easiest method for an amateur to form the right angle in sawing the pieces from the long slip of gilt or other frame, so that they may join exactly and neatly in framing a picture;" and you then proceed to describe the home-made mitre box you have put together to aid you in cutting the pieces of the frame from the moulding, and say that "although you saw it through according to the angle slit, invariably the corners will not join in an exact and neat manner." This, I must first remark, shows that the "angle slit," as you call it, in your mitre box, otherwise the transverse saw cut or saw kerf through the upright sides of the box, is not truly made at an angle of 45°. Were it so, the joints at the corners of the frame could not fail to be made exactly and neatly, to use your own words, because when two pieces correctly cut at an angle of 45° are put together, edge to edge, one piece being cut in one direction and the other in a direction precisely opposite, they cannot fail to make a true right angle or angle of 90°. You will find a mitre box correctly illustrated and described in Mr. Adamson's paper on "Artistic Furniture" in No. 3 (page 35), the illustrations being Figs. 10 and 11 in page 37, the former showing a perspective view of the box, and the latter the box in plan, or as viewed from above, exhibiting clearly the directions of the transverse cuts that must be made downwards through the sides. I venture to recommend you to have a mitre box made for your own use by a skilled mechanic, and you will then find no difficulty in cutting your mouldings properly, because you will have a true and reliable guide to cut them by. If you are disposed to lay out a few shillings in providing yourself with a machine for cutting mouldings, I have given here an illustration of an "Improved Mitre-Cutting Machine" made by Messrs. Booth Brothers, Dublin, and sold by all dealers in tools, etc. The price of this machine to cut 2-in. mouldings is 12s. 6d., and an extra cutter may be had for 2s. 3d. There was an American mitre box in the market some years ago, with which a tenon saw or a panel saw could be used equally well; but this seems to have been superseded by the "Improved New Langdon Mitre Box," of which an illustration is appended. Ordinary mitre boxes cut from right angles to angles of 45° inclusive, but this mitre box cuts, by using the circular arm or guides, from right angles to 73° on 2½-in. wood. In addition to this, it is claimed for the Improved Langdon that it is the only box adjustable for mitring circular work in patterns, emery wheels, and segments of various kinds. The prices for the four sizes in which it is made range from 24s. without saw, and 34s. with saw, to 70s. and 84s., without and with saw respectively. The first size will cut 3½ in. at right angles, and 2¼ in. at the mitre, and the largest size 9½ in. at right angles, and 6½ in. at the mitre. You are now in possession of the best existing means for cutting mitres correctly. Thank you for your efforts in making WORK known to your friends.

Electro-magnet.—A. G. (*Croydon*).—Your query, relative to an electro-magnet required "to lift the greatest weight with two quart Bunsen cells," cannot be exactly answered, unless we know the conditions under which the magnet will be worked. For instance, a magnet working at some distance from a battery through a line of wire will not develop as much magnetic power as the same magnet worked up close to the battery. In planning a



Booth's Improved Mitre-Cutting Machine.

magnet to develop the greatest capabilities of a battery, we must take into consideration the resistance of the whole circuit, and proportion the coils of wire to that resistance. Then, again, the nature of the work to be done must be considered, whether the magnet will be required to simply hold up a weight *placed to its poles*, or to *attract and lift* a weight to its poles from a distance. The power of a magnet on an armature detached from its poles varies in an inverse ratio with the square of the



Improved New Langdon Mitre Box.

distance of the armature from the poles of the magnet. The best *holding* power is secured by a horseshoe form of magnet with the cores placed close together, whilst attractive power is slightly increased by placing the cores wider apart. Assuming that you will use a magnet close up to the battery, the following instructions will enable you to utilise the full power obtainable from two cells placed in series. Use a 9 in. length of ⅜-in. best Swedish iron made soft by annealing, and bent into horseshoe form, with its legs or cores 2 in. apart. Get two ebonite or boxwood bobbins 3 in. in length by 1¼ in. in diameter, and wind on them (as a reel of cotton is wound) nearly 1 lb. of cotton, or silk-covered No. 16 B. W. G. copper wire. Silk-covered is best if you can get it. Wind one bobbin from right to left, the other left to right, and join the inside end of one coil to the outside end of the other. Fill both bobbins. The bobbins may be had from Messrs. H. Dale & Co., 26, Ludgate Hill, E.C., who will also wind the wire on them if you desire them to do so. No. 18 wire may be used if the magnet is to be worked at a distance from the battery.—G. E. B.

Wood Screw Cutters or Boxes.—R. R. (*London, E.C.*).—The screw boxes and taps described in "Our Guide to Good Things" (No. 3, p. 46) may be purchased of Messrs. Richard Melhuish & Sons, 85 and 87, Fetter Lane, E.C., or direct of Messrs. Alexander von Glehn & Co., 7, Idol Lane, London, E.C., agents for Messrs. Peugeot Brothers in the United Kingdom. The specialities of this firm of French manufacturers seem well worthy of attention. Having given the information you ask for, I will append the concluding paragraph of your communication, and express my pleasure at finding that WORK has been so heartily welcomed by yourself and others. You write:—"Allow me to congratulate you on the success which must attend the publication of such sterling information in such a readable form, and at such a popular price. I am sure WORK will do good work."

Coloured Cement.—J. H. C. (*Bow Road, E.*).—I am not acquainted with any firm that make coloured cement, but it is possible for you to give any colour you please to cement, whether chocolate, black, or any other, by adding to the cement colouring matter which you can purchase of any oil and colourman.

Advertisements in "Work," etc.—F. T. (*Bristol*).—It is difficult, I can assure you, to locate advertisements otherwise than where they are at present. I can only submit your views to the Manager of the Advertisement Department, to whom I will also mention your wish to see a "Sale and Exchange Column" opened in the Magazine. Your newspaper cutting—*i.e.*, "Lighting by Electricity"—has been forwarded to Mr. Bonney, who will readily tell you what he thinks of the statements set forth therein. Stereotyping will be treated in WORK in due season.

Slips for Wood-Carving Tools.—TOM.—You ought to be able to procure these through any dealer in tools, etc. If, however, you are unable to do so, apply to Messrs. R. Melhuish & Sons, 85 and 87, Fetter Lane, London, E.C. In reply to your query as to how these shaped slips are to be used, you will understand that as it is not possible to sharpen some varieties of carving tools, as V cutting and veining tools, on a hone or sharpening stone, as ordinary plane irons, chisels, and gouges, the sharpening must be effected by rubbing the shaped stone on the edge of the tool. In order to effect this in the most thorough manner possible, the slips are shaped to suit the conformation of the tools for which they are intended.

Marking Steel and Iron Tools.—W. L.—Put a coating of yellow soap or beeswax on the steel or iron on which you wish to write your name. Then, having written your name on the soap or wax with a bone point or quill point, taking care to mark through the soap, raise a small wall of the material used for coating the iron round the space on which the name is written, and fill with a mixture of strong acetic acid 3 oz., and sulphate of copper, sulphate of alum, and muriate of soda, each 1 drachm. Let this remain until the name is sufficiently bitten in, and then pour off acid and clean the iron.

Overmantel.—BARRINGTON writes:—"The overmantel shown in No. 2 can be made from old tea chests. I think they are made of a kind of cedar. They can be had for threepence each—good-looking wood." [This is going to a "deeper depth" than Mr. Adamson even contemplated. Will you kindly send me a sample of the wood, as I should very much like to have a look at it? I have never been able to put tea-chest wood myself to any other use than that of lighting fires, and it will be quite a new experience to me to find that our friends the Chinese have used any material in this way worth having. It is otherwise with the lead lining.—ED.]

Elizabethan Twist in Lathe.—C. C. E. writes:—"May I remark—as you invite remarks—upon your description of the 'Lukin' Lathe, that a spiral chuck, without the addition of a costly set of change wheels, is of no use even for a spiral; and that with them you cannot cut an *Elizabethan* twist, which has a convex contour; and that although I have *heard* of two lathes that can cut them, I do not believe there is any lathe in existence by which they can be produced. Hence the word 'Elizabethan' is misleading. They are effected by cutting a spiral groove, and then finishing approximately by rasps and files and paper, as you probably know." [If the spiral groove can be cut in the lathe, why cannot the sharp edge of the spiral groove be also removed, and the Elizabethan twist finished, without rasp or file? After receiving your letter I called on a turner, in whose shop I had seen some Elizabethan twists, and he assured me that they had been produced entirely in the lathe, and were turned, I think, at Bristol. He also showed me a double spiral that he had begun to cut himself, but which had broken through a flaw in the wood.

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Further, to make sure that I was not mistaken in the matter, I put the question to another workman, who has gained his experience under one of the first, if not *the* first, lathe-makers in the United Kingdom, and he, too, said there was no difficulty whatever in *completing* an Elizabethan twist in the ornamental lathe, with proper tools. I am aware that your experience is also great, and I shall be happy to insert any communication from you *per contra* to what has been stated as to the possibility of doing what you say can only be partly done, but not finished, in the lathe, leaving it to be taken up and answered by those who, like yourself, are skilled turners.—ED.]

Bookbinding.—J. S. (*Moss Side, Manchester*).—Papers on this subject are being written for WORK.

Violin Making.—J. S. (*Moss Side, Manchester*).—A skilled maker of violins is intrusted with the preparation of a series of thoroughly practical papers on this subject. These will be brief, and to the purpose, and will be commenced at the first convenient opportunity.

Coal Mining.—FRETWORK.—You say:—"Will you kindly let me know if you intend devoting any part of your paper to the art of mining, such as coal? I hope this will not offend you. As I am a collier, it is natural I should ask such a question."—[To this I may say that no question, be it what it may, that is put with reference to any kind of work that is done by man, can give offence. On the contrary, your query, and all queries, are heartily welcomed, because they evince the wide and earnest interest that is taken by workmen of all grades and trades in WORK, which is intended by all who are concerned in its production to be truly and honestly helpful to workmen. You may rest assured that when any opportunity offers of touching on matters connected with your calling, it will be done; and that when any invention is produced likely to lessen the perils of mining, and to be helpful to the miner, it will be described. Meanwhile do not hesitate to ask any special question bearing on your trade on which you require information.—ED.]

Cabinet Making.—R. G. (*Birmingham*).—You will soon have detailed instructions in cabinet making to help you. It is scarcely worth while to devote a supplementary sheet to working drawings of a cabinet in fretwork large enough to keep the weekly numbers of WORK in. Make a plain box of the proper length and breadth, and 3 or 4 in. deep. Ebonise it, and cut an overlay in white wood to be attached to sides and top. You will soon find suitable patterns in fret work for overlays of this kind in WORK. There are plenty of good things of this sort in store for you.

Thin Circular Saws.—A. R. (*Scorrier*) writes:—"It is every employer's place to get as much work done with as little cost as possible; some try to do it by having cheap tools and cheap machines, and employing men that have had little practice at low wages, which, in the long run, proves to be the dearest. A bad machine, a bad saw, and an inexperienced man is dear at any price. To work a thin saw—in the first place, there should be a good machine, a good saw, and a careful practical man to work it. I say 'careful,' because I have seen men that have had much practice very careless, and no better men than those that have had little practice. We often see in sawmills where there is hard and soft wood nearly all the time cutting, that the saw that has to cut the hard wood has to cut the soft wood as well; this is a mistake. A saw to cut hard wood should be stouter than for soft wood, and sharpened differently; consequently it will require more power to drive it, which means cost. Again, should saws that are stout enough for soft wood be used in cutting hard wood, they soon get crippled, and run untrue. Therefore you will see that by having saws for each class of work, thinner saws may be used in cutting soft wood to advantage. Again, how often do we see deals up to 11 in. deep, having only two cuts put in them, sawn in the deal frame, when with care and a little skill they could be sawn with a circular saw, and more than twice the amount of work turned out in a given time, and with a very little more waste than if sawn with frame-saws. As a rule, deal frame-saws are from 16th to 15th gauge. A circular saw 30 in. diameter, of 14th gauge (which is less than the 80th part of an inch stouter), could be used for cutting deals, etc., up to 11 in. deep if kept expressly for such work, and worked by a careful man. Another advantage in cutting deals with thin circular saws, is to have a curved wedge made of steel fixed close to the teeth at the back of the saw—the front of the wedge to be the thickness of saw-kerf, and the back of wedge one-half thicker than saw-kerf; this will prevent a certain amount of friction on saw-plate; and on the timber leaving the saw, the teeth at the back are not so liable to catch the timber and throw it back to the sawyer, doing him, perhaps, great injury. Much more might be said in reference to thin circular saws, but I will take up no more valuable space in this number."

Electrotyping.—J. O. A. (*Manchester*) writes:—"I shall be much obliged if you will give me a little information on electrotyping. I have been trying to make an electro for letterpress printing, but I cannot get the deposit to go into the hollow parts of the mould. The mould is $2\frac{1}{2}$ in. × $3\frac{3}{4}$ in., the anode is $4\frac{1}{2}$ in. × 7 in., and the battery is a three-cell quart Daniell coupled in series. The solution in porous cells is about 12 water to 1 acid. I have a zinc cylinder in one cell, and a cast zinc plate in each of the other cells. The mould is suspended in a solution of cupric sulphate in the usual manner, and the connections are made with No. 16 copper wire. Does a stronger solution in porous cell give a stronger current? also, do the zincs require filing smooth when they become pitted or eaten by the acid? I find that I do not get as good results when I only use one or two cells, but I do not want to add to the number until I get some information as to the cause of failure." [To the above the reply is:—All your arrangements are right as far as I can see. Have you used the best black-lead, and brushed this carefully into the deeper parts of the mould? The deeper hollows must receive careful attention to insure success. Use a small sable pencil to brush the lead in the hollows. Have you any acid in the cupric sulphate solution? It must have some free sulphuric acid to dissolve the anode, or the work will not go on right. A stronger solution in the porous cells would strengthen the current, but 1 of acid to 12 of water is quite strong enough for a Daniell battery. Have you amalgamated the zincs? No need to file out the pits in the zinc plates; but well brush them, and keep them amalgamated. All that I have written on this subject in my article on the Bunsen battery applies with equal force to the Daniell. A bunch of copper wires as an anode, with the tips of the wires pointing close into the hollows, may help to start the deposit in those parts. —G. E. B.]

Proportion of Fly-wheel.—J. P. A. writes:—"I should like to know the proper rule for finding the diameters of the driving cone, when the diameters of the cone on the spindle are known. I have a small one; the diameters are $1\frac{1}{2}$ in., $2\frac{1}{4}$ in., 3 in., and $3\frac{3}{4}$ in., and I want to make the driving cone, so that the band will be as tight on one speed as another, for turning metal."—[To this the answer is:—It would be very much less expense and trouble if J. P. A. endeavoured to find some one who has a pattern, as it is a costly one to make; but by finding the proportion between the relative speeds, the tension of the band may be made to coincide with each. At the same time, for such diameters as given ($3\frac{3}{4}$ being the largest), it is not worth the trouble, as little metal-work can be done in such a lathe, except of a very small size.—J. H. H.]

Polishing Metal.—MACHINIST.—You ask:—"How are the finely-polished surfaces seen on the lathes and machines sent out by such firms as the Britannia Company obtained? Especially those of the cog-wheels, where it is impossible for an emery disc to be used, seeing that the part between the edge of the face and the boss is recessed. Then, again, there are the mouldings, and small hand-wheels with circular rims." [To this the reply is:—The process of polishing and finishing lathe and other work will depend a great deal upon the way in which it is manufactured. Such work as referred to is generally left from the machine, and very little time spent on it after. With regard to the finish of cog-wheels, these should not be polished in any way whatever, but left entirely from the cutter. —J. H. H.]

III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

IN deference to a wish evinced by many, that their queries should be submitted to correspondents and readers *en masse*, presumably in the hope that many may be induced to give their experiences on the points and questions raised, this section of "Shop" has been commenced for this purpose. Correspondents and others answering inquiries in this section are requested to head replies with the number, subject, and initials, etc., or *nom de plume*, at the commencement of each query, and append their own initials, etc., or *nom de plume*, as they may prefer.

1. Lawn-Tennis Court.—J. H. C. (*Bow Road, E.*) asks:—"Can any one tell me if there is any sand which would bind without cement, for covering a lawn-tennis court? I am told that in the south of France the lawn-tennis courts are covered in with such a sand."

2. Elastic Moulds for Electrotyping.—T. W. (*Foley Street, W.*) writes:—"Will any one give, under the preceding heading in WORK, a receipt for making elastic moulds for taking impressions from metal medallions slightly *undercut?*"

3. Graduation of Hydrometer.—BARRINGTON writes:—"Will some one tell me how to graduate a hydrometer? I have made one of tin, and I do not know how to mark the scale. I want to use it for liquids between 1010 and 1040."

4. Cheap Still.—BARRINGTON asks:—"What is a cheap way of getting up a still to produce small quantities of distilled water, using the heat of a grate?"

5. Solidifying Petroleum Oil.—W. H. (*Liverpool*) asks:—"How can I solidify the common commercial petroleum oil, such as is sold for lighting purposes?

LETTERS awaiting attention have been received from the following correspondents:—X. Y. Z. (*Orkney*), G. M. (*Calvin*), S. A. C. (*Coventry*), W. H. D. (*Edinburgh*), W. D. (*Newcastle-on-Tyne*), W. J. W. (*Henley-on-Thames*), A. C. J. (*Regent's Park*), F. S. (*Exeter*), W. R. S. (*Croydon*), F. R. S. (*Kentish Town*), A. E. G. (*Ipswich*), R. O. (*Soho*), W. J. P. (*Portslade*), "Moulder" (*Limehouse*), J. B. (*Longfleet*), H. B. (*Glasgow*), O. H. (*London*), H. H. (*Gosport*), T. E. (*Stamford Hill*), S. H. (*Esher*), F. B. B. (*Colchester*), J. I. (*Longsight*), J. W. L. (*Sheffield*), A. E. (*Liverpool*), Amateur (*Liverpool*).

Trade Notes and Memoranda.

THE Taff Vale Railway Company has introduced the electric light into its passenger trains. The power is obtained from Brush machines run off the axle of the van.

EDISON'S newest phonograph, comprising all his most recent improvements, is now on view at the Gainsborough Gallery, Old Bond Street, London, W.

A NEW patent safety lamp for miners, the invention of Mr. Clifford, was recently exhibited at a meeting of the Manchester Geological Society, and has been described as sound in principle, and capable of giving very good results, both as to safety and all-round illuminating power.

A LIGHT hammer, weighing 10 ozs. only, faced with hide, for jewellers' use, has been designed by W. Oliver, of Buffalo, U.S.A. It is useful for striking an elastic blow without inflicting injury upon delicate work.

M. CHEVREUL, chemist, author, and centenarian, has just died. He was the last witness of the Great Revolution, having been born on August 31, 1786. In 1813 he was a professor in the Lycée Charlemagne, an officer of the university, and Director of the Chemical Department at the Gobelins-Tapestry. It was here that he devoted himself to those studies in colours which have made his name famous. It was his researches into the composition of fatty substances that led to the invention of the stearine candle. He was a Fellow of the Royal Society of London, and a Commander of the Legion of Honour.

NOEL MASSON, who died a few days ago in Paris, was so unfortunate as to lose both his hands in the Franco-German War. In spite of this misfortune he became one of the most expert etchers of his time. He was best in landscape. At the time of his death he was only in his thirty-fifth year.

WOODS OF BRITISH BORNEO.—The principal and most useful wood found in British Borneo is "bilian," or iron wood. Its characteristics are these:—hardness, density, and the being ant-proof. The logs run from 2 ft. 3 in. to 2 ft. 6 in. square, and, say, 40 ft. in length. It affords excellent shingle wood, and is a most valuable timber for general purposes, being large and plentiful. Other sinking woods are "russock," "grealing," and "mirabou," the last named being a heavy, dark, yellow wood, valuable for furniture, and taking a fine polish. Camphor wood also, and a red wood, "sirayah," which gives logs 5 ft. in diameter and 40 ft. long, are also found in abundance; in fact, the woods of Borneo are so various that, as yet, most of them are comparatively little known. Some of them are already in demand for Australia, and so good a customer so near to Borneo will work, it is to be hoped, for mutual benefit.

ONE of the largest wire ropes ever made for use in this country has been recently sent out from the works of Dixon and Corbitt, and R. S. Newall and Company, Gateshead. Its circumference is 5 in., and its length 4,560 yds. It weighs over twenty-three tons, and occupied three large railway trucks. It was made for the North British Railway Company, and is to be used for drawing their trains from the Queen Street Station, Glasgow, to Cowlairs.

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Microscopes and Objects.—Slides for Exhibiting from 5s. dozen. Microscopes and all requisites. List.—HENRY EBBAGE, 344, Caledonian Road, London. [2 R

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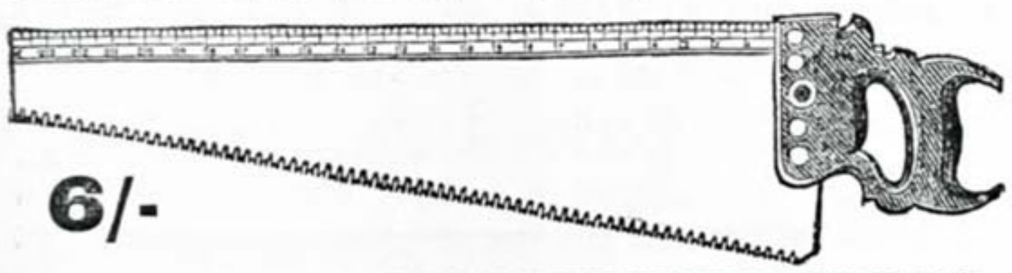

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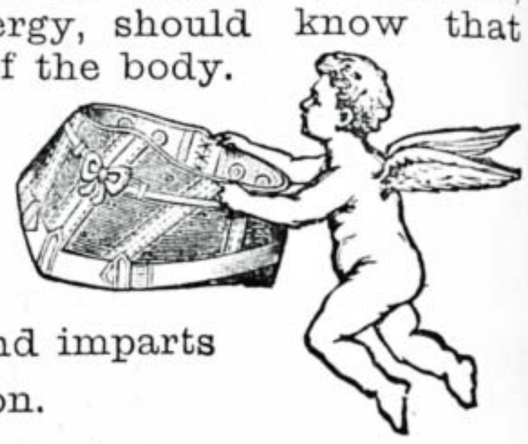

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